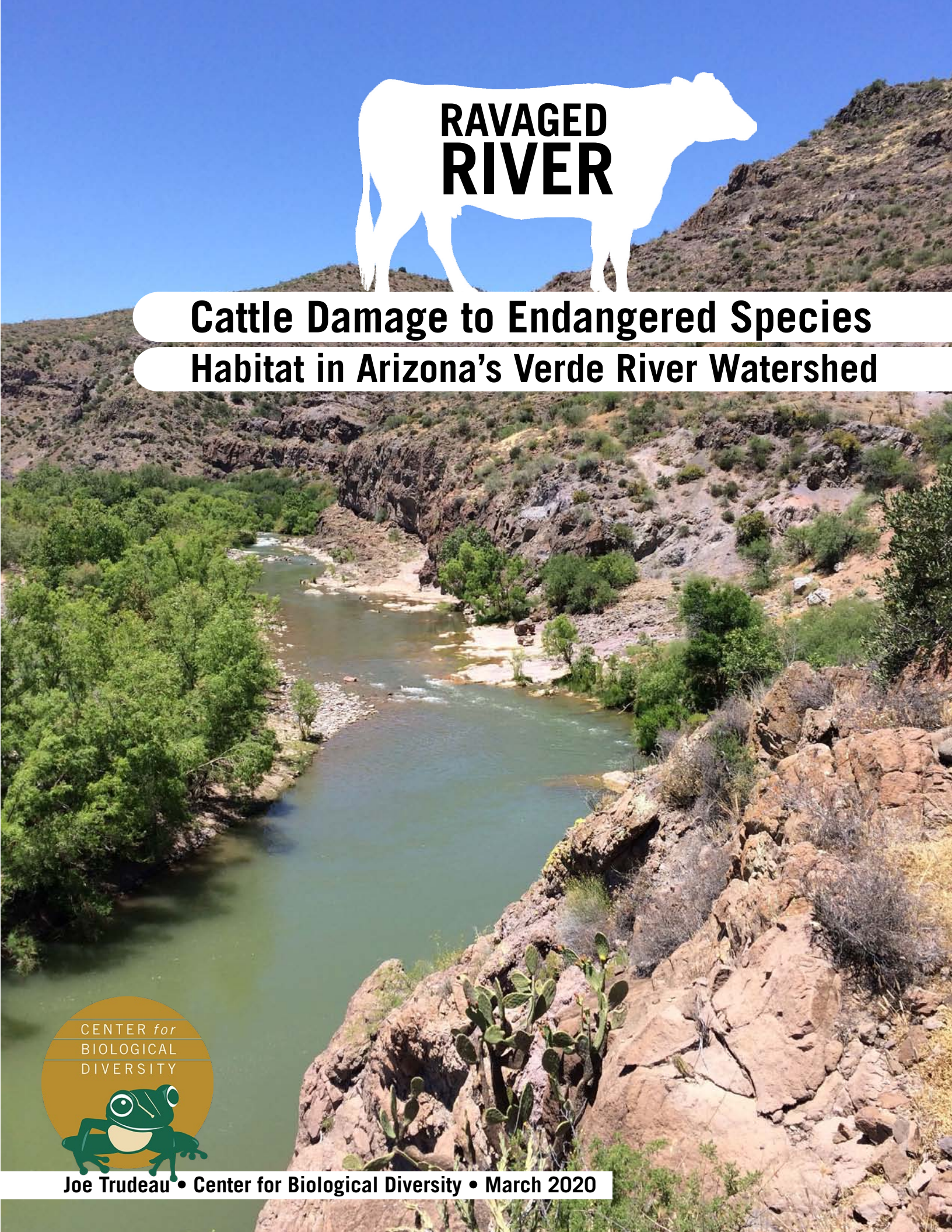

RAVAGED RIVER

Cattle Damage to Endangered Species Habitat in Arizona's Verde River Watershed

CENTER *for* BIOLOGICAL DIVERSITY

Joe Trudeau • Center for Biological Diversity • March 2020

The US Forest Service is Failing to Protect Arizona's Verde River

Livestock Damage Found on Seventy Percent of River Surveyed

Executive Summary

Cattle are inflicting severe and widespread damage on Arizona's Verde River and its tributaries, including 41 miles protected as a national Wild and Scenic River. This report documents a new field survey by the Center for Biological Diversity which shows that cows are trampling on and defecating throughout these once-unspoiled waterways and imperiling streamside forest habitat. Cow feces and other evidence of cattle impacts were found along nearly three-fourths of the 143 stream miles surveyed. That's despite a 1998 U.S. Forest Service agreement to install fencing and take other measures to keep livestock off the Verde, Fossil Creek and other central Arizona waterways, where thousands of people come to boat, swim, birdwatch, hike and camp.

Hundreds of cows, some of them feral, are destroying crucial habitat for 14 threatened or endangered species protected under the Endangered Species Act. These rare animals — including fish, birds, snakes, and a frog — rely on what should be healthy, lush riparian ecosystems for their survival. Ten of those species have designated or proposed critical habitat in the Verde watershed and eight of those have critical habitat directly on the Verde River and its tributary streams — the East Verde River, Fossil Creek, Red Creek, Wet Beaver Creek and Sycamore Creek. Another 14 riparian- and aquatic-dependent animals that rely on the Verde and its tributaries are recognized by the U.S. Forest Service as sensitive species in the Southwest.

The 170-mile long Verde River is already stressed by dams, drought, invasive species, urban sprawl and excessive groundwater pumping. Now these important ecosystems are being further ravaged by unauthorized cattle grazing. In addition to cow feces along the banks and polluting the water, cattle damage includes trampled river banks, incising cow trails and tracks, streambank erosion, large swaths of barren, denuded ground, and overgrazed woody and herbaceous vegetation. Conservationists have secured agreements from the U.S. Forest Service to install livestock fencing to protect habitats and facilitate wildlife recovery — but it seems that those agreements have been forgotten. Fencing to protect riparian areas was installed along hundreds of miles of southwestern rivers and creeks in Arizona and New Mexico following a 1997 lawsuit filed by the Center against the U.S. Forest Service. The resulting 1998 legal settlement applied to 14 public-land grazing allotments in the Verde River watershed which include riparian habitat for federally protected spikedace, razorback sucker, Gila topminnow, Southwestern willow flycatcher, and other species.

Following increasing reports of cattle wandering into protected rivers, the Center launched a field survey in 2019 of riparian areas along 143 stream miles within the Verde River watershed. Surveys were completed on the Verde and East Verde rivers and portions of major tributaries such as Wet Beaver Creek, Fossil Creek, Red Creek and others. Presence of cattle was widespread and cattle grazing damage was found along 70% of the stream miles we surveyed. Approximately 44% of stream miles were ranked with moderate to significant grazing harm and a mere 30% of stream miles had no signs of cattle at all. Damage from feral and permitted cattle was the most severe in the areas near the confluence of the Verde and East Verde rivers and Fossil Creek and reaches up and downstream from there. Fence conditions were poor, or fencing was missing entirely, in dozens of locations inspected across the study area.

This survey shows that Forest Service livestock management practices are failing to protect Arizona's riparian and aquatic habitats and the endangered animals that depend on them. The survival of wildlife that rely on healthy riparian and aquatic ecosystems in the Southwest requires that livestock exclosure fencing is properly erected, better monitored, diligently maintained and stanchly enforced. The Forest Service must work quickly to remove unauthorized livestock and improve management practices to protect imperiled species from further population declines and, ultimately, extinction.

Ravaged River: Cattle Damage to Endangered Species Habitat in Arizona's Verde River Watershed

Joe Trudeau • March 2020

1) A trodden streambed along Tangle Creek, Red Creek Allotment, Tonto National Forest.

2) Unmaintained riparian exclosure fencing, Skeleton Ridge Allotment, Tonto National Forest.

3) A cow-trampled spring along the Verde River, Antelope Hills Allotment, Prescott National Forest.

4) Cow in the river between the Brown Springs and Hackberry Allotments, Prescott and Coconino National Forests.

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Verde River, AZ 2019 Cattle Impact Suvey

Key to Map Features

Overall Grazing Impact Level

- **Absent (30%)**
- **Light (26%)**
- **Moderate (8%)**
- **Significant (36%)**
- Surveyed Grazing Allotments
- Designated Wilderness
- Wild and Scenic River
- National Forest
- Bureau of Land Management
- State Trust Land
- Private Land
- Indian Reservation

Key to Allotment Numbering

Prescott National Forest
1) Muldoon
2) West Bear/Del Rio
3) China Dam*
4) Sand Flat*
5) Perkinsville*
6) Horseshoe
7) Antelope Hills*
8) Brown Springs

Coconino National Forest
9) Windmill West
10) Beaver Creek*
11) Apache Maid
12) Walker Basin
13) Hackberry/Pivot Rock*
14) Ike's Backbone
15) Fossil Creek*

Tonto National Forest
16) Skeleton Ridge
17) Deadman Mesa
18) Cedar Bench
19) Bull Springs
20) Red Creek*
21) Sears Club/Chalk Mountain*
22) Bartlett

* 1998 Settlement Allotment

0 5 10 Miles

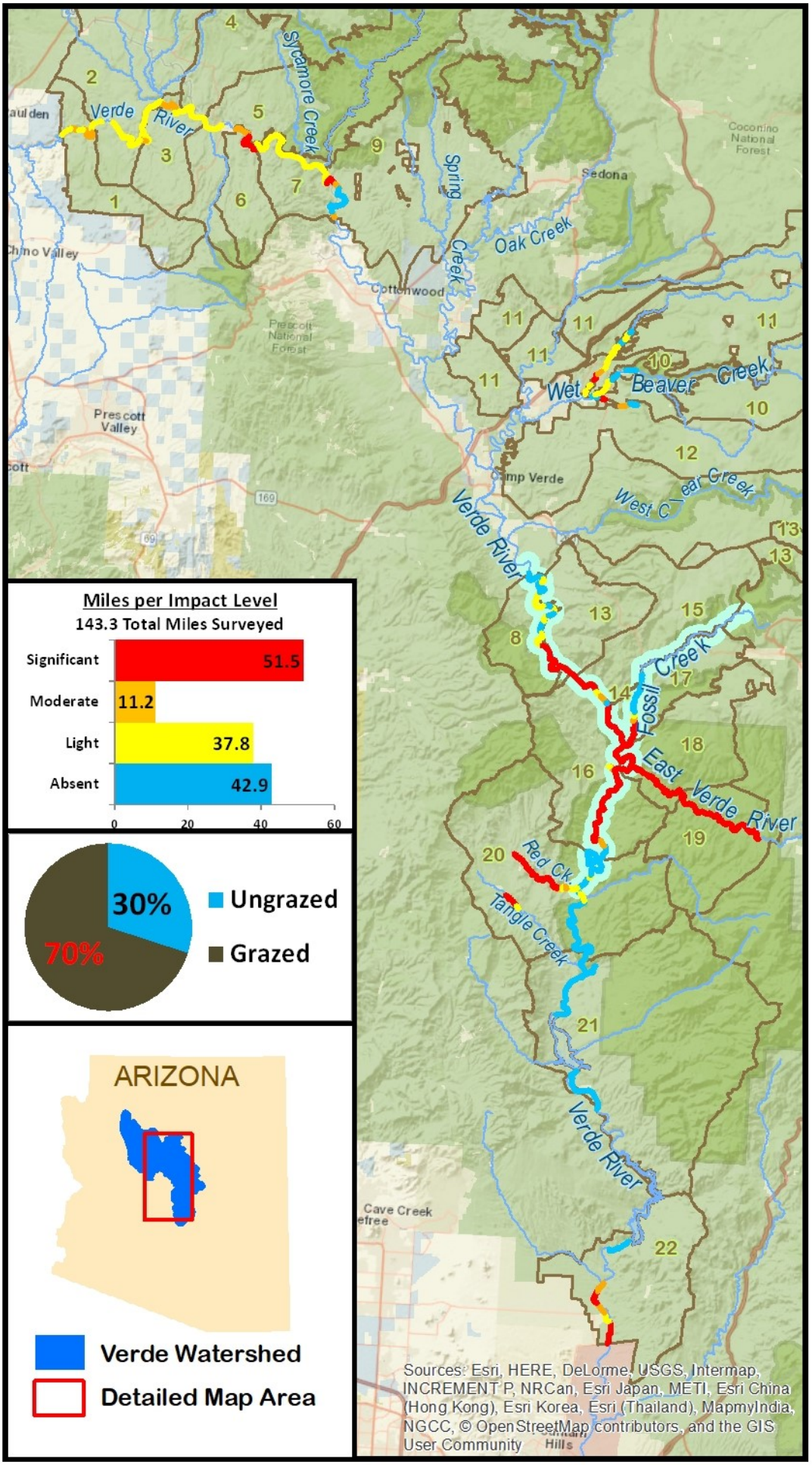


Table 1: Cattle Impact Levels for all Surveyed Allotments

	Allotment Name 1998 Settlement in Red	Stream Name	Detail Map #	Cattle Impact Levels				
				Absent	Light	Moderate	Significant	Total
Prescott National Forest	Muldoon	Verde River	2		1.90	1.82		3.72
	West Bear/Del Rio	Verde River	2		8.14	0.71		8.84
	China Dam	Verde River	2		1.85	1.23		3.08
	Sand Flat	Verde River	2		1.77			1.77
	Perkinsville	Verde River	2		1.33			1.33
	Horseshoe	Verde River	2		0.32	1.16	1.98	3.46
	Antelope Hills	Verde River	2		8.71		0.50	9.21
Prescott & Coconino NFs	Border of Antelope Hills & Windmill West	Verde River	2	3.05		0.85	0.45	4.35
	Border of Brown Springs, & Hackberry/Pivot Rock	Verde River	4	5.01	4.24		4.38	13.63
Coconino National Forest	Beaver Creek	Wet Beaver Creek	3	1.58	1.84			3.42
		Red Tank Draw	3		1.78	0.38	0.47	2.63
		Walker Creek	3	0.12			0.64	0.76
	Apache Maid	Red Tank Draw	3	1.01	1.66			2.68
	Walker Basin	Walker Creek	3	0.69		0.79		1.47
Coconino & Tonto	Border of Skeleton Ridge & Fossil Creek	Verde River	4	0.16	0.47	0.59	2.10	3.32
	Border of Fossil Creek & Deadman Mesa*	Fossil Creek	4	0.68				0.68
Tonto National Forest	Border of Cedar Bench & Skeleton Ridge*	Verde River	4				1.03	1.03
	Skeleton Ridge	Verde River	4	0.86		0.53	10.56	11.96
	Border of Deadman Mesa & Skeleton Ridge	Fossil Creek	4	2.42	0.35	0.34	2.14	5.25
	Border of Cedar Bench & Skeleton Ridge*	Fossil Creek	4				0.67	0.67
	Skeleton Ridge	Houston Creek	5		0.14	0.39		0.53
	Cedar Bench	Verde River	5				3.74	3.74
		East Verde River	5				5.96	5.96
	Bull Springs	East Verde River	5	0.26			7.90	8.16
	Border of Skeleton Ridge & Red Creek	Verde River	5	1.38				1.38
	Red Creek	Red Creek	5		1.43	0.81	5.07	7.31
		Tangle Creek	5		0.26		1.20	1.46
		Verde River	5	12.60	0.80			13.40
	Sears Club/Chalk Mountain	Verde River	6	10.19				10.19
		Sycamore Creek	6	1.20				1.20
	Bartlett	Verde River	7	1.67	0.81	1.59	2.67	6.73
	Total Mileage of Each Impact Level			**42.88**	**37.79**	**11.17**	**51.47**	**143.31**

* May include portions of Ike's Backbone Allotment. Allotment status is undetermined and may have been reassigned to Skeleton Ridge.

Table 2: Rare wildlife of riparian and aquatic ecosystems of the Verde River Watershed, Arizona

Native Fish		Birds	Amphibians & Reptiles	Insects	Mollusks
ESA-Listed	Not ESA-Listed				
Gila chub (*Gila intermedia*)[1]	Roundtail chub (*Gila Robusta*)[6]	Southwestern willow flycatcher (*Empidonax traillii extimus*)[1]	Chiricahua leopard frog (*Rana chiricahuensis*)[4]	Parker's Cylloepus riffle beetle (*Cylloepus parkeri*)[6,7] [possibly extinct]	Verde rim springsnail (*Pyrgulopsis glandulosa*)[6,7,8]
Loach minnow (*Tiaroga cobitis*)[1]	Headwater chub (*Gila nigra*)[6]	Yellow billed cuckoo (*Coccyzus americanus*)[5]	Narrow-headed gartersnake (*Thamnophis rufipunctatus*)[5]	A caddisfly (*Wormaldia planae*)[6,8]	Page springsnail (*Pyrgulopsis morrisoni*)[6,7,8]
Spikedace (*Mega fulgida*)[1]	Sonora sucker (*Catostomus insignis*)[6]	Mexican spotted owl (*Strix occidentalis lucida*)[4]	Northern Mexican gartersnake (*Thamnophis eques megalops*)[5]		Fossil springsnail (*Pyrgulopsis simplex*)[6,7,8]
Razorback sucker (*Xyrauchen texanus*)[1]	Desert sucker (*Catostomus clarkii*)[6]	Bald eagle (*Haliaeetus leucocephalus*)[6]	Lowland leopard frog (*Lithobates yavapaiensis*)[6]		Brown springsnail (*Pyrgulopsis sola*)[6,7,8]
Gila topminnow (*Poeciliopsis occidentalis*)[2]	Longfin dace (*Agosia chrysogaster*)[6]	Common black hawk (*Buteogallus anthracinus*) [6]	Northern leopard frog (*Lithobates pipiens*) [6]		
Desert pupfish (*Cyprinodon macularius*)[2]	Speckled dace (*Rhinichthys osculus*)[6]				
Woundfin (*Plagopterus argentissimus*)[3]					
Colorado pikeminnow (*Ptychocheilus lucius*)[3]					

1 = Endangered species with final designated critical habitat
2 = Endangered species without designated critical habitat in the Verde watershed
3 = Same as above (#2) but an experimental, non-essential population
4 = Threatened species with final designated critical habitat
5 = Threatened species with proposed critical habitat
6 = USFS Southwestern Region Sensitive Species (ESA-listed species are also USFS sensitive species)
7 = Endemic to riparian sites within the Verde Watershed
8 = Globally/critically imperiled but not listed under ESA (NatureServe)

See maps 8 through 15 for species-by-species reporting on cattle impacts to critical habitats.

Methodology: Field Survey, Data Analysis, and Mapping

The purpose of this survey was to determine if cattle are present in riparian areas that have been closed to grazing through grazing exclosures or which contain habitat for species protected under the Endangered Species Act, and to quantify those impacts. Based on prior legal agreements, and in many cases codified in agency planning documents and annual grazing instructions, the allotments identified for survey should have functional exclosures to keep cattle out of the surveyed riparian and aquatic ecosystems. These data are the most comprehensive, quantifiable, and up to date (as of summer/fall 2019) inspections of riparian conditions and cattle occupancy for the study area.

During the summer and fall of 2019, field surveyors documented conditions along almost 145 miles of ten named streams on US Forest Service lands in the Verde River watershed (Map 1 and Table 1). Surveyed streams were within or adjacent to 22 public lands grazing allotments, ten of which were included in the 1998 settlement (Table 1). All 22 allotments contain habitat for federally protected species (see maps). Aquatic, riparian, xeri-riparian, floodplain, terrace, and upland habitats were carefully investigated for evidence of livestock presence such as tracks, feces, trails, carcasses, live animals, and river crossing locations. In addition, exclosure fencing, gates, allotment boundary fencing, corrals, and other range developments were opportunistically inspected for evidence of use or maintenance. In total, over 200 miles were walked in order to gather the range of data reported here. All data is supported by more than 1,700 georeferenced photographs documenting evidence of livestock presence and their impacts. Surveyors walked the length of riparian areas and adjacent uplands, and using the ESRI Survey 123 data collection app on iPad tablets, documented the severity and extent of cattle impacts within these ecosystems following a standardized protocol that recorded impacts in the following six impact categories (see Table 9 for more detailed information):

(1) Severity of grazing impacts on herbaceous vegetation and grasses.
(2) Severity of browsing impacts on streamside woody regeneration.
(3) Severity and (4) extent of ground disturbances from trailing, trampling, and wallowing.
(5) Severity and (6) extent of streambank degradation.

Multiple georeferenced photo points were taken along each segment to document evidence of livestock impacts, conditions of fencing and other range infrastructure, or other observations such as ungrazed areas or cultural sites. Observations of cattle impacts were collected for 350 distinct segments, each generally ¼ to 1 mile in length, and averaging 0.41 miles long. Segments were field-delineated based on topography, access, and trends in impact severity. At each segment endpoint, a condition score was recorded for each of the six impact categories along a range of 0 to 4 based on the severity and extent of the particular impact. A segment was rated 0 for a particular category if no evidence of impact was seen, 1 if impacts were limited, 2 if impacts were light and scattered, 3 if impacts were moderate and widespread, and 4 if impacts were severe and pervasive.

Following field surveys, each segments "overall impact level" (which is defined as absent, light, moderate or significant) was calculated. To determine overall impact level, the condition severity scores for each segment endpoint were collated and weighted. Generally, if specific category impacts were light or limited in four categories, the overall impact was considered light. If impact severity in five or more categories were light, then the overall impact was evaluated as moderate. Overall impact scores of moderate also included combinations of limited, light and moderate scores in all six categories. If three or more categories conditions were moderate, then the overall impact level rose to significant. If at least one impact category was severe or pervasive, then the overall impact level was evaluated as significant (weighting matrix is provided in Table 10). Each survey segment was color coded for its overall impact level (see maps). Segments were linked together across full river extents, and the mileage of overall impact level for each allotment, stream, or critical habitat unit was then calculated. Results are presented in this report on a series of maps and tables.

The Devastating Impact of Livestock on Southwestern Rivers

More than a century of livestock grazing in southwestern riparian ecosystems has led to a decline in insect, fish, reptile, amphibian, bird, mammals, ground cover, biomass, and native vegetation,[1] making grazing the most destructive widespread activity wrought on desert rivers and watersheds since the arrival of American settlers. Decades of scientific research comparing grazed and ungrazed areas have documented that livestock grazing in the arid Southwest negatively effects water quality and quantity, stream channel morphology, hydrologic function, soil stability, streambank vegetation, and aquatic and riparian wildlife - proving that livestock grazing is an ecological catastrophe.[2]

US Forest Service scientists have concluded that grazing is the most studied threat to riparian areas in the American West[3] and that livestock use is incompatible with maintenance of habitat for wetland and riparian wildlife.[4] Livestock grazing effects have contributed to the listing of many threatened and endangered species, including the yellow-billed cuckoo,[5] spikedace and loach minnow,[6] Northern Mexican and narrow-headed gartersnakes,[7] and others in the Verde River.

Grazing impacts on riparian areas fall into four categories: impacts on streamside vegetation, stream channel morphology, water quality/quantity, and streambanks.[8] Collectively, these impacts to vegetation, soils, and water lead to losses of wildlife habitat, reduced stream flow, increased pollution, and eradication of plant and animal species.[9] Grazing on riparian plants reduces vegetative cover and exposes soil to erosion, which in combination with streambank trampling leads to increased erosion and turbidity.[10] Grazing animals congregating in riparian areas feed on native tree and shrub regeneration, disrupting their reproductive cycle and leading to destabilized streambanks,[11] increased water temperatures, loss of hiding and breeding cover, and defecation and urination directly in the water. Reduced rainfall infiltration into soil[12] and increased sediment loads combine to exacerbate riparian ecosystem decline and increase stream down-cutting.[13]

Grazing in adjacent arid uplands and river terraces is equally as disastrous, with impacts to biological soil crusts, vegetation, soils, and wildlife.[14] A comprehensive review of grazing impacts in the Southwest concluded that no current grazing management system used by land managers is appropriate for the Sonoran Desert.[15] Cattle grazing also negatively impacts high elevation montane riparian meadows and creeks through hydrologic changes, soil compaction, erosion, bank instability, and siltation.[16] Often, these impacts can have greater effects on wildlife than do wildfires.[17]

The only widely accepted way to eliminate cattle impacts and restore stream health is the exclusion of domestic grazers. When maintained, grazing exclosure fencing protects riparian areas and leads to rapid recovery of vigorous native vegetation[18] which is critical to maintain streambank stability and provide habitat to riparian and aquatic wildlife.[19] Furthermore, removal of livestock from sensitive ecosystems such as Southwestern riparian areas is a critical component of adapting to climate change.[20] Prominent fish scientists have concluded that livestock grazing has been a major factor in eliminating native fishes from portions of their historic ranges[21] and that habitat degradation is most easily reversed by excluding livestock from the riparian area.[22]

As briefed here, the scientific literature documenting the impacts of livestock grazing on ecosystems is extensive, and universally shows severe and lasting negative impacts.[23] Livestock removal leads to a rapid regrowth of riparian willow shrub communities[24] and reestablishment of high-quality habitat[25] and avian populations.[26] But full recovery of mature deciduous forests and the diversity that comes with them takes decades of cattle exclusion,[27] meaning monitoring, enforcement, and maintenance of riparian exclosures is crucial. Like many Southwestern rivers, the Verde River and its incredible native wildlife have endured abuse and neglect for too long. Complete exclusion of livestock animals is urgently needed to protect critical habitat and ensure the recovery and viability of native wildlife.

Plate 1: Comparison of Grazed and Ungrazed Riparian Habitats - Upper Verde

Two very different scenes of the Upper Verde River in the Antelope Hills Allotment, Prescott NF

AREA GRAZED BY CATTLE	
Photo ID	1417
Date	7/15/19
Latitude	N 34.85091
Longitude	W 112.06744
Allotment	Antelope Hills

Impacts: Tracks, trails, bank shearing, erosion, sedimentation, feces at waters edge, grazed grasses and herbs, browsed shrubs and trees. Trails descend to river via side canyon to the north from the Windmill West Allotment.

AREA NOT GRAZED BY CATTLE (2 miles downstream of photo above)	
Photo ID	1441
Date	7/15/19
Latitude	N 34.83515
Longitude	W 112.05015
Allotment	Antelope Hills

Notes: Dense native herbaceous plants cover the banks, including yerba mansa, indicating an undisturbed riparian ecosystem. Well-formed banks and hummocks are resistant to erosion and filter pollutants.

Plate 2: Comparison of Grazed and Ungrazed Riparian Habitats - Lower Verde

Two scenes of the Verde River comparing the Skeleton Ridge and Red Creek Allotments, Tonto NF.

AREA GRAZED BY CATTLE

Photo ID	103
Date	5/30/19
Latitude	N 34.31752
Longitude	W 111.67937
Allotment	Skeleton Ridge

Impacts: Tracks, trails, low angle bank shearing, erosion, sedimentation, fresh feces at waters edge, heavy grazing on grasses down to stubble, browsed trees, lack of any tree regeneration. Area smelled strongly of urine and feces.

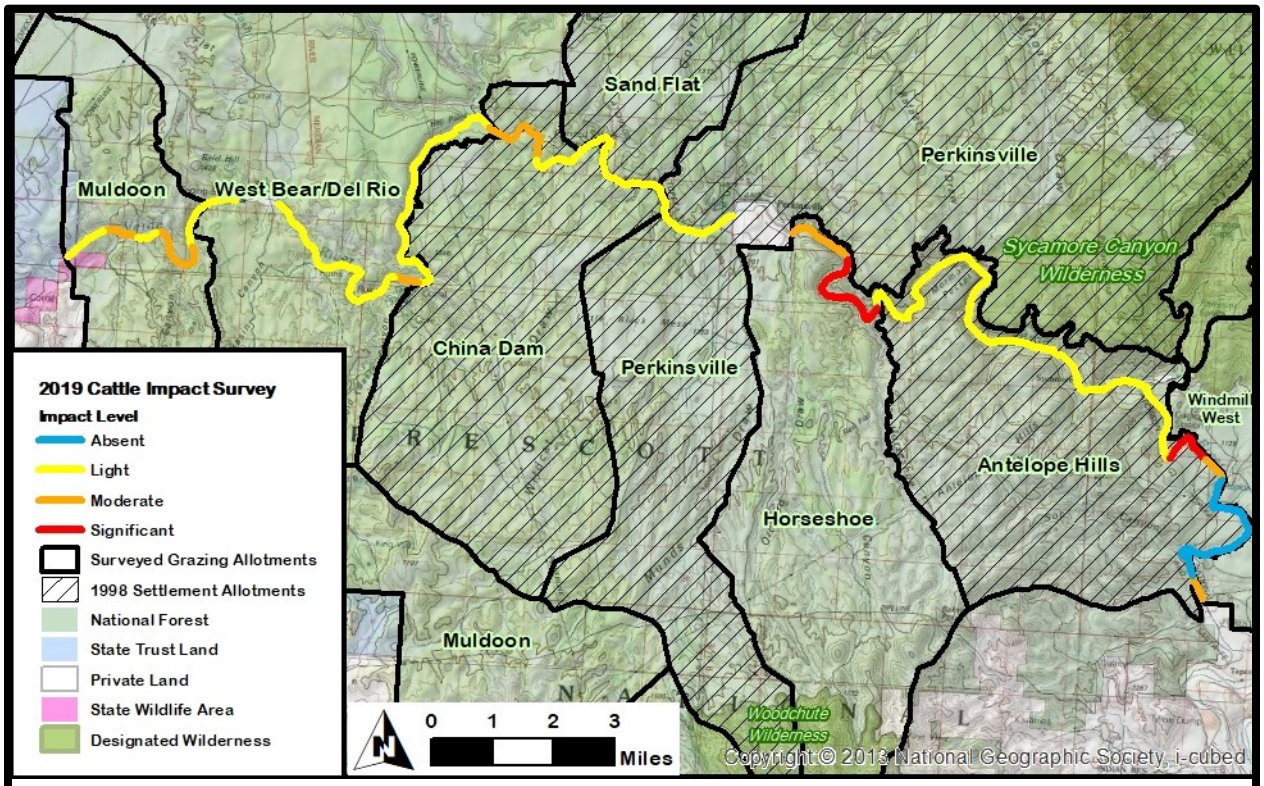
AREA NOT GRAZED BY CATTLE
(27 miles downstream of photo above)

Photo ID	678
Date	6/20/19
Latitude	N 34.09939
Longitude	W 111.70477
Allotment	Red Creek

Notes: Dense grass and herbaceous plants over 4 feet tall cover the banks. Well-formed banks are resistant to erosion and filter pollutants. Multi-storied deciduous trees and tree regeneration provide bird habitat.

Map 2: Upper Verde River from the State Wildlife Area to the End of Forest Service Land

Color-coded survey segments follow river centerline on all maps. Colors correspond to grazing impact level.



Cattle Impacts to Threatened and Endangered Species Critical Habitats in UPPER VERDE Allotments

	Public Land Grazing Allotment	Muldoon	West Bear/ Del Rio	China Dam	Sand Flat	Perkinsville	Horseshoe	Antelope Hills
STUDY AREA	1998 Settlement Allotment	No	No	Yes	Yes	Yes	No	Yes
	National Forest Unit	Prescott	Prescott	Prescott	Prescott	Prescott	Prescott	Prescott
	Stream Surveyed	Verde	Verde	Verde	Verde	Verde	Verde	Verde
CRITICAL HABITAT	S.W. Willow Flycatcher							YES
	Yellow-billed cuckoo	YES	YES	YES	YES	YES	YES	YES
	N. Head Gartersnake	YES	YES	YES	YES	YES	YES	YES
	N. Mex. Gartersnake	YES	YES	YES	YES	YES	YES	YES
	Loach Minnow	YES	YES	YES	YES	YES	YES	YES
	Spikedace	YES	YES	YES	YES	YES	YES	YES
	Razorback Sucker					YES	YES	YES
GRAZING IMPACT	Absent (3.0 Miles)	0	0	0	0	0	0	3.0
	Light (24.0 Miles)	1.9	8.1	1.9	1.8	1.3	0.3	8.7
	Moderate (5.7 Miles)	1.8	0.7	1.2	0	0	1.2	0.8
	Significant (3.0 Miles)	0	0	0	0	0	2.0	1.0
	Total (35.7 Miles)	3.7	8.8	3.1	1.8	1.3	3.5	13.5

2019 FIELD SURVEYS DOCUMENTED THAT 91% OF THE UPPER 35.7 MILES OF THE VERDE RIVER HAD RECENTLY BEEN IMPACTED BY CATTLE GRAZING AND TRAMPLING.

Upstream of Perkinsville, impacts were widespread and fresh cattle evidence was documented. Downstream of Perkinsville, the Horseshoe and Antelope Hills Allotments were most significantly impacted, and live tagged cattle were observed in the riparian area.

Cattle impacts were recorded on 32.7 miles (91%) of the Upper Verde River.

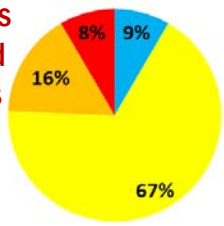


Plate 3: Cattle Impact Examples in two Upper Verde River Allotments

Additional photos of cattle impacts, evidence of presence, and fencing condition available by request.

AREA GRAZED BY CATTLE

Photo ID	1311
Date	7/17/19
Latitude	N 34.87525
Longitude	W 112.16061
Allotment	Horseshoe

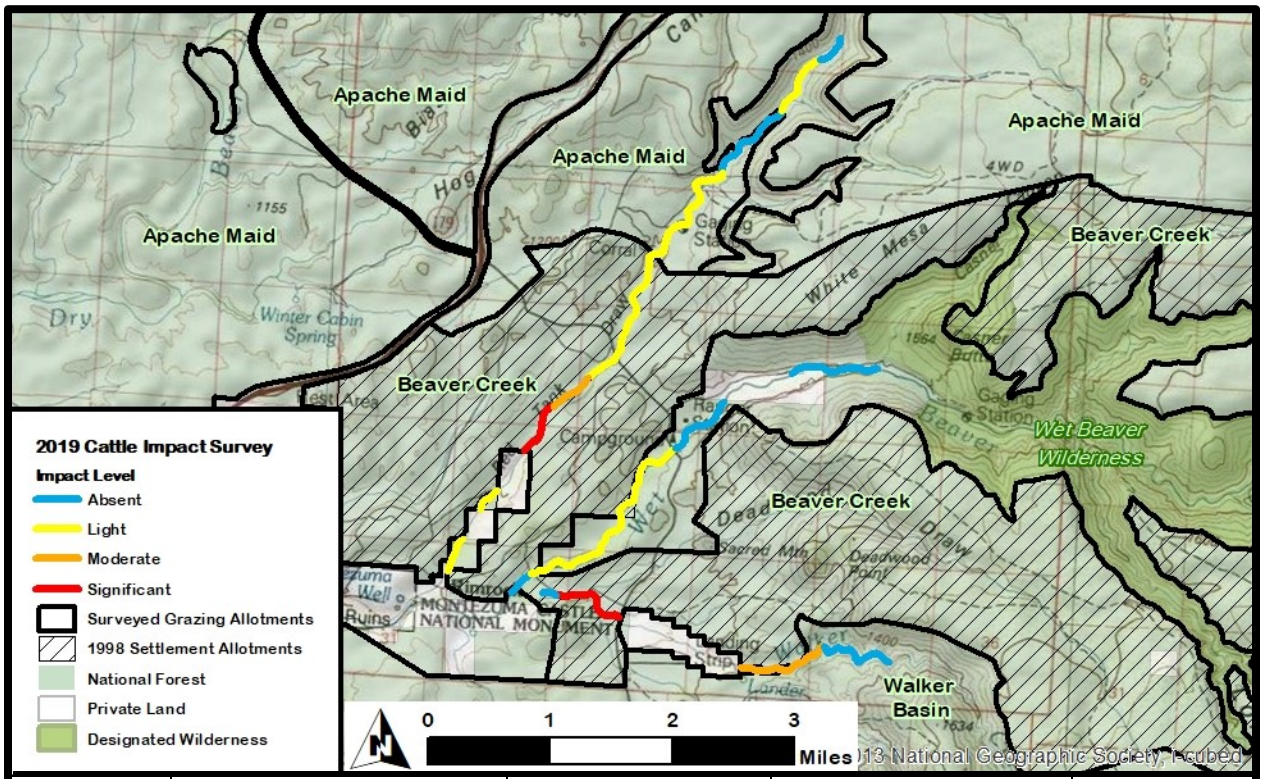
Impacts: Tracks , trampled vegetation, feces in water and at waters edge, grazing on grasses and herbs, streambank shearing and degradation.

AREA GRAZED BY CATTLE

Photo ID	1192
Date	7/18/19
Latitude	N 34.9104
Longitude	W 112.25908
Allotment	China Dam

Impacts: Tracks destroying biological soil crust near high water limit of flooding.

Map 3: Wet Beaver Creek and Tributaries (Walker Creek and Red Tank Draw)



	Public Land Grazing Allotment	Apache Maid	Beaver Creek	Walker Basin
STUDY AREA	1998 Settlement Allotment	No	Yes	No
	National Forest Unit	Coconino	Coconino	Coconino
	Stream Surveyed	Red Tank Draw	Wet Beaver Creek, Walker Creek, and Red Tank Draw	Walker Creek
CRITICAL HABITAT	Yellow-billed Cuckoo	YES	YES (all 3 streams)	YES
	Gila Chub	YES	YES (Walker and Red Tank)	YES
	Loach Minnow		YES (Wet Beaver)	
	Spikedace		YES (Wet Beaver)	
GRAZING IMPACT	Absent (3.4 miles)	1.01	1.7	0.69
	Light (5.28 miles)	1.66	3.62	
	Moderate (1.17 miles)		0.38	0.79
	Significant (1.11 miles)		1.11	
	Total (10.96 miles)	2.68	6.81	1.47

69% OF THE 10.96 MILES SURVEYED IN THE WET BEAVER CREEK WATERSHED UPSTREAM FROM MONTEZUMA'S CASTLE NATIONAL MONUMENT HAVE DOCUMENTED CATTLE IMPACTS.

THE MOST SEVERELY IMPACTED REACHES ARE ADJACENT TO PRIVATE LAND ON WALKER CREEK AND RED TANK DRAW ON THE BEAVER CREEK ALLOTMENT.

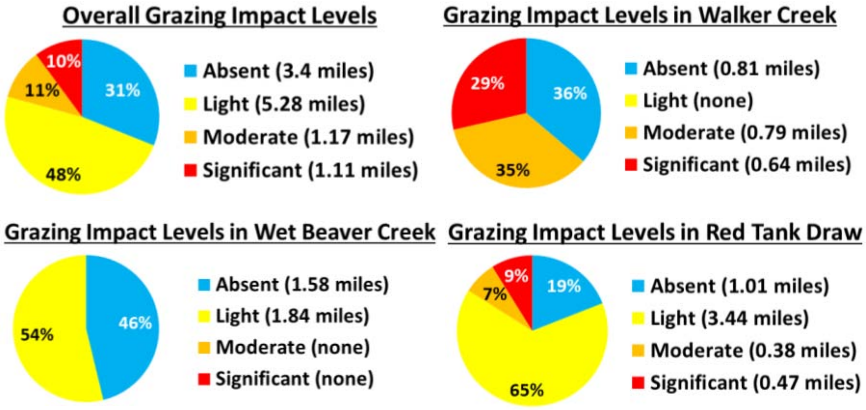


Plate 4: Cattle Impact Examples in the Beaver Creek Allotment

Additional photos of cattle impacts, evidence of presence, and fencing condition available by request.

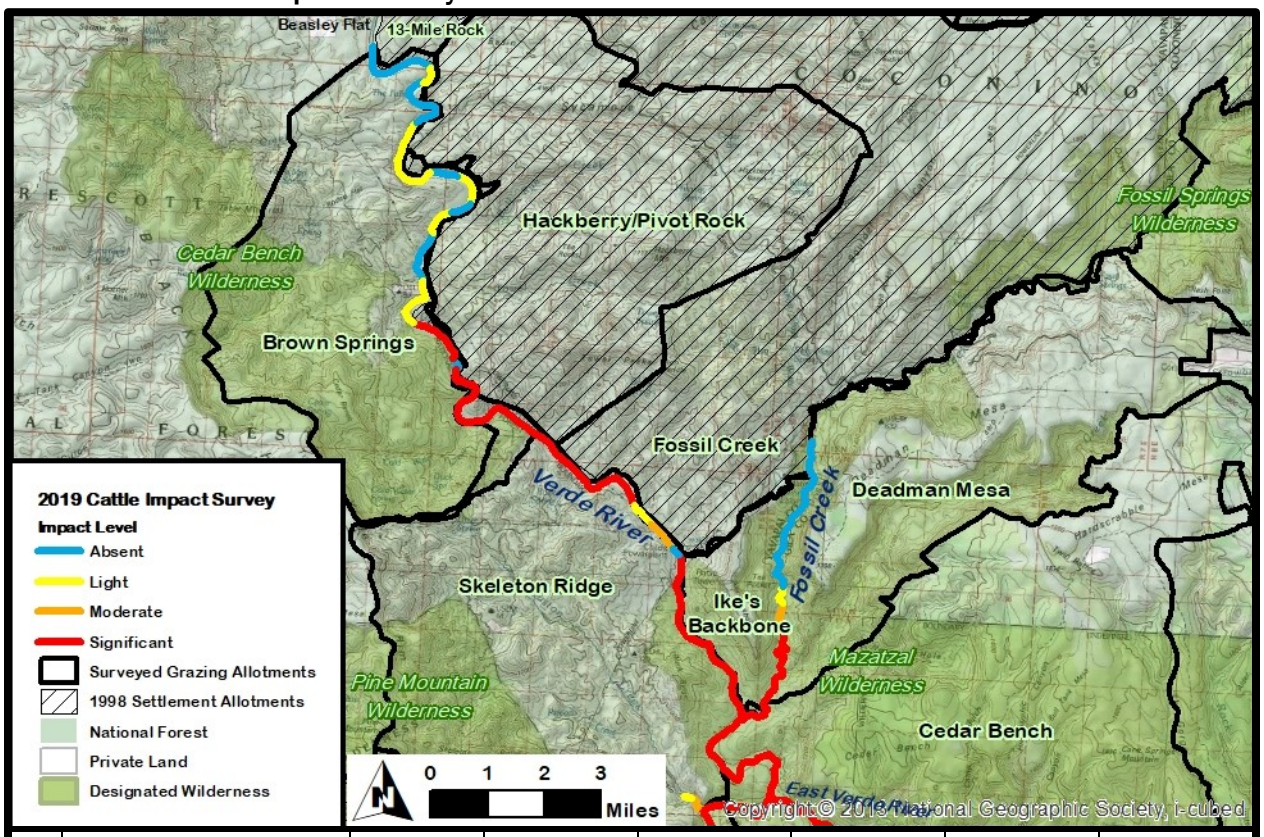
AREA GRAZED BY CATTLE	
Photo ID	1695
Date	10/6/19
Latitude	N 34.66919
Longitude	W 111.73379
Allotment	Beaver Creek
Stream	Red Tank Draw

Impacts: Tracks and trails along creeks edge, sheared and destabilized banks from cattle climbing out of creek leading to increased erosion and sedimentation.

AREA GRAZED BY CATTLE	
Photo ID	1646
Date	10/7/19
Latitude	N 34.6505
Longitude	W 111.72913
Allotment	Beaver Creek
Stream	Walker Creek

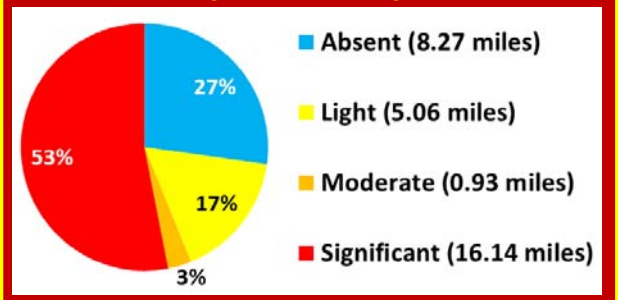
Impacts: Trampled area near creek, feces near waters edge.

Map 4: Beasley Flat to Confluence with East Verde River



	Public Land Grazing Allotment	Brown Springs	Hackberry/ Pivot Rock	Fossil Creek	Skeleton Ridge	Deadman Mesa	Cedar Bench
STUDY AREA	1998 Settlement Allotment	No	Yes	Yes	No	No	No
	National Forest Unit	Prescott	Coconino	Coconino	Tonto	Tonto	Tonto
	Stream Surveyed	Verde River	Verde River	Verde River, Fossil Creek	Verde, Fossil, Houston Cks.	Verde River, Fossil Creek	Verde River
CRITICAL HABITAT	S.W. Willow Flycatcher	YES	YES				
	Yellow-billed cuckoo	YES	YES		YES		YES
	N. Head Gartersnake	YES	YES	YES	YES	YES	YES
	N. Mex. Gartersnake	YES	YES	YES	YES	YES	YES
	Loach Minnow			YES		YES	YES
	Spikedace	YES	YES	YES	YES	YES	YES
	Razorback Sucker	YES	YES	YES	YES		YES

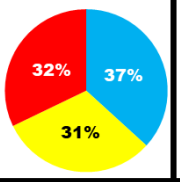
CUMULATIVE IMPACT SCORES FOR 30.4 SURVEYED MILES BETWEEN BEASLEY FLAT AND EAST VERDE RIVER



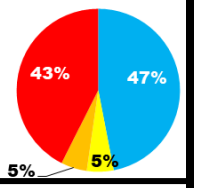
73% OF BEASLEY TO EAST VERDE IS IMPACTED BY CATTLE.

IMPACT LEVELS FOR GROUPS OF ADJACENT ALLOTMENTS

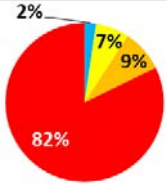
Brown Springs/ Hackberry/ Pivot Rock Allotments



Fossil Creek/ Skeleton Ridge/ Deadman Mesa/Cedar Bench Allotments



Fossil Creek/ Skeleton Ridge Allotments



Skeleton Ridge/ Cedar Bench Allotments

100% Significantly Grazed!

Plate 5: Cattle Impact Examples from Beasley Flat to the East Verde River

Additional photos of cattle impacts, evidence of presence, and fencing condition available by request.

AREA GRAZED BY CATTLE	
Photo ID	274
Date	6/6/19
Latitude	N 34.3818
Longitude	W 111.75508
Allotment	Between Brown Springs and Hackberry/Pivot Rock
Stream	Verde River

Impacts: Tracks and trails along rivers edge, sheared and trampled banks, browsing and grazing, feces in abundance.

AREA GRAZED BY CATTLE	
Photo ID	124
Date	5/30/19
Latitude	N 34.32784
Longitude	W 111.69367
Allotment	Skeleton Ridge
Stream	Verde River

Impacts: Heavy use trails inside the exclosure fencing. Trampling, feces, wallows, grazing and browsing abundant.

Plate 6: Cattle Impact Examples on Lower Fossil Creek

Additional photos of cattle impacts, evidence of presence, and fencing condition available by request.

AREA GRAZED BY CATTLE

Photo ID	946
Date	6/26/19
Latitude	N 34.31134
Longitude	W 111.66826
Allotment	Between Skeleton Ridge and Deadman Mesa
Stream	Fossil Creek

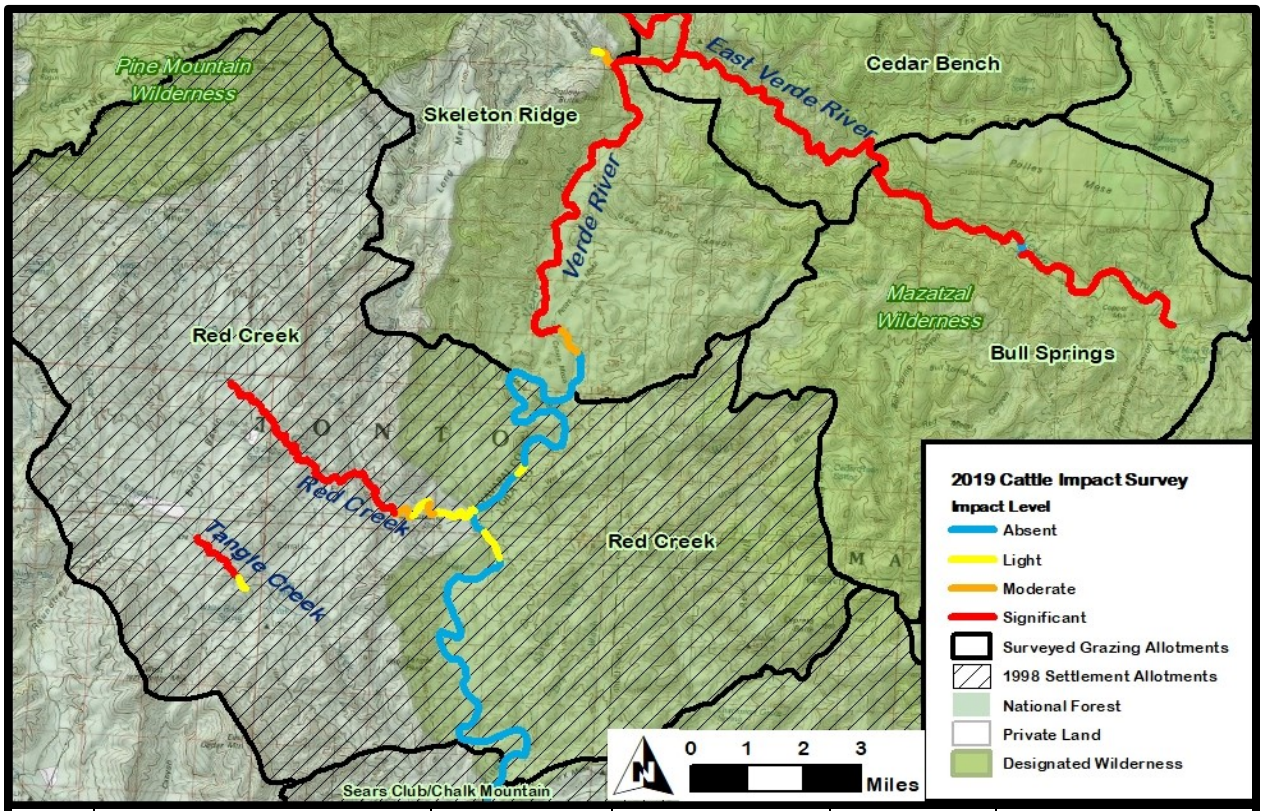
Impacts: Heavy browsing on *Alnus* regeneration. Also, feces at waters edge, tracks, trails, trampling, and streambank shearing in this location.

AREA GRAZED BY CATTLE

Photo ID	967
Date	6/25/19
Latitude	N 34.32689
Longitude	W 111.66365
Allotment	Between Skeleton Ridge and Deadman Mesa
Stream	Fossil Creek

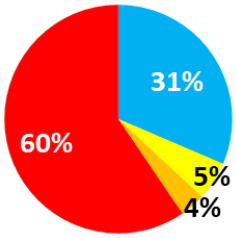
Impacts: Trampling and feces at waters edge, tracks, streambank shearing, and grazing on grasses and sedges.

Map 5: East Verde River to Southern Boundary of Red Creek Allotment



	Public Land Grazing Allotment	Skeleton Ridge	Cedar Bench	Bull Springs	Red Creek
STUDY AREA	1998 Settlement Allotment	No	No	No	Yes
	National Forest Unit	Tonto	Tonto	Tonto	Tonto
	Stream Surveyed	Verde River	Verde & E. Verde R.	East Verde R.	Verde, Red & Tangle Ck
CRITICAL HABITAT	Southwest Willow Flycatcher	YES	YES		YES
	Yellow-billed Cuckoo	YES	YES		YES
	Narrow Headed Gartersnake	YES	YES	YES	YES
	Northern Mexican Gartersnake	YES	YES		YES
	Loach Minnow		YES		
	Spikedace	YES	YES		
	Razorback Sucker	YES	YES		YES

CUMULATIVE IMPACT SCORES FOR 48.1 SURVEYED MILES BETWEEN EAST VERDE RIVER & SEARS CLUB ALLOTMENT

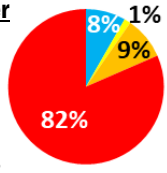


- Absent (15.1 miles)
- Light (2.6 miles)
- Moderate (1.7 miles)
- Significant (28.6 miles)

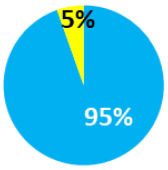
69% OF THE VERDE RIVER IS IMPACTED BY CATTLE. 60% OF SURVEY MILES ARE SIGNIFICANTLY IMPACTED.

VERDE RIVER SURVEYS

Verde River Skeleton Ridge/ Cedar Bench Allotments

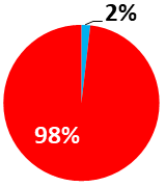


Verde River Red Creek Allotment

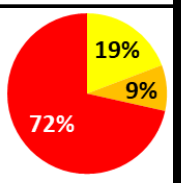


TRIBUTARY SURVEYS

East Verde Cedar Bench/ Bull Springs Allotments



Red & Tangle Creeks Red Creek Allotment



Notes: 1) Red and Tangle Creeks do not contain designated or proposed Critical Habitat but do provide habitat for listed species. 2) Tangle Creek was surveyed to determine if additional surveying is warranted. 3) 0.53 miles of Houston Creek are included in Verde River Totals

Plate 7: Cattle Impact Examples along the East Verde River

Additional photos of cattle impacts, evidence of presence, and fencing condition available by request.

AREA GRAZED BY CATTLE	
Photo ID	905
Date	6/26/19
Latitude	N 34.27501
Longitude	W 111.63396
Allotment	Cedar Bench
Stream	East Verde River

Impacts: Extreme grazing down to stubble, feces at water edge, heavy browsing on woody shrubs and trees, trampled and sheared streambanks.

AREA GRAZED BY CATTLE	
Photo ID	798
Date	6/27/19
Latitude	N 34.24148
Longitude	W 111.56232
Allotment	Bull Springs
Stream	East Verde River

Impacts: Fresh feces in the river. Dozens of live cattle seen in this area.

Plate 8: Cattle Impact Examples along Red Creek

Additional photos of cattle impacts, evidence of presence, and fencing condition available by request.

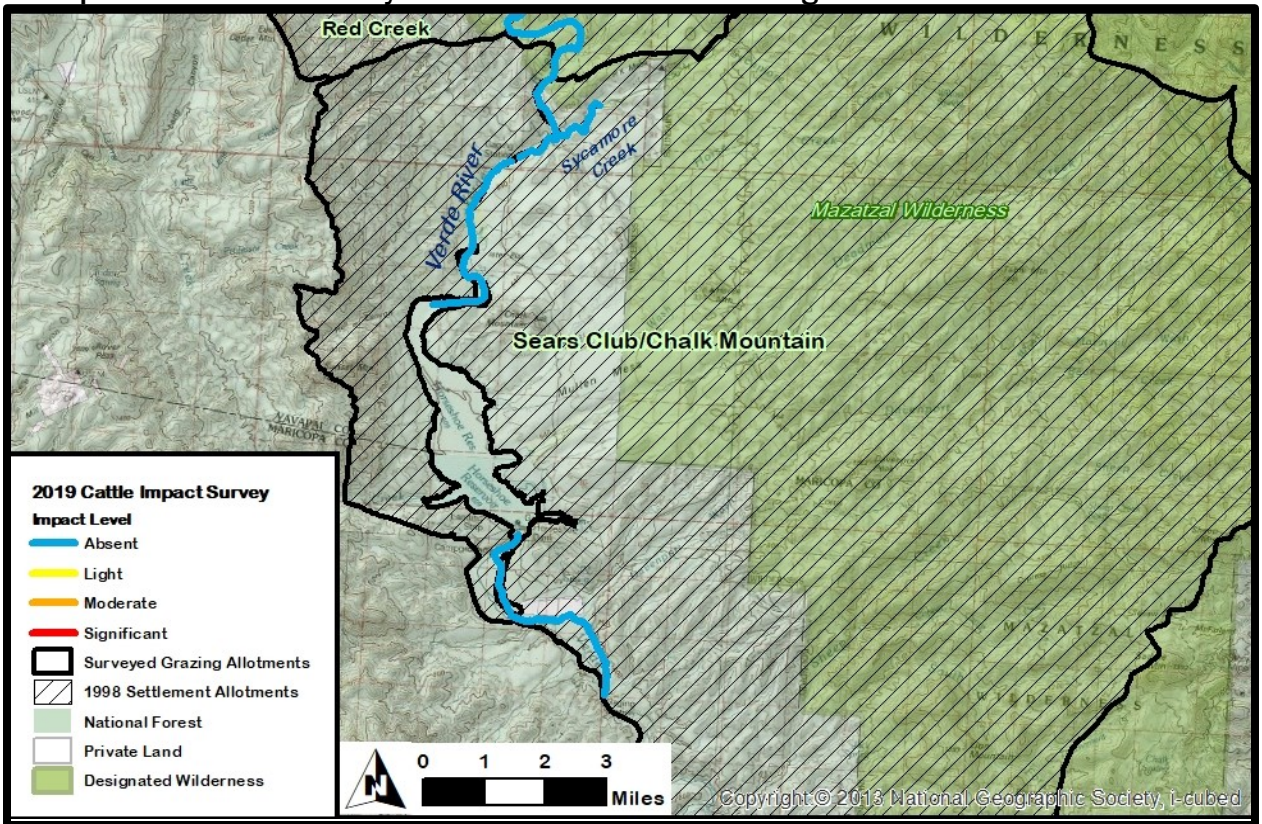
AREA GRAZED BY CATTLE	
Photo ID	426
Date	6/14/19
Latitude	N 34.16174
Longitude	W 111.74378
Allotment	Red Creek
Stream	Red Creek

Impacts: Feces on a rock in the creek.

AREA GRAZED BY CATTLE	
Photo ID	658
Date	6/14/19
Latitude	N 34.16985
Longitude	W 111.76977
Allotment	Red Creek
Stream	Red Creek

Impacts: Feces at the waters edge, tracks and trampled banks, and heavily grazed grasses, rushes, and sedges.

Map 6: Northern Boundary of Sears Club Allotment to High Water Limit of Bartlett Lake

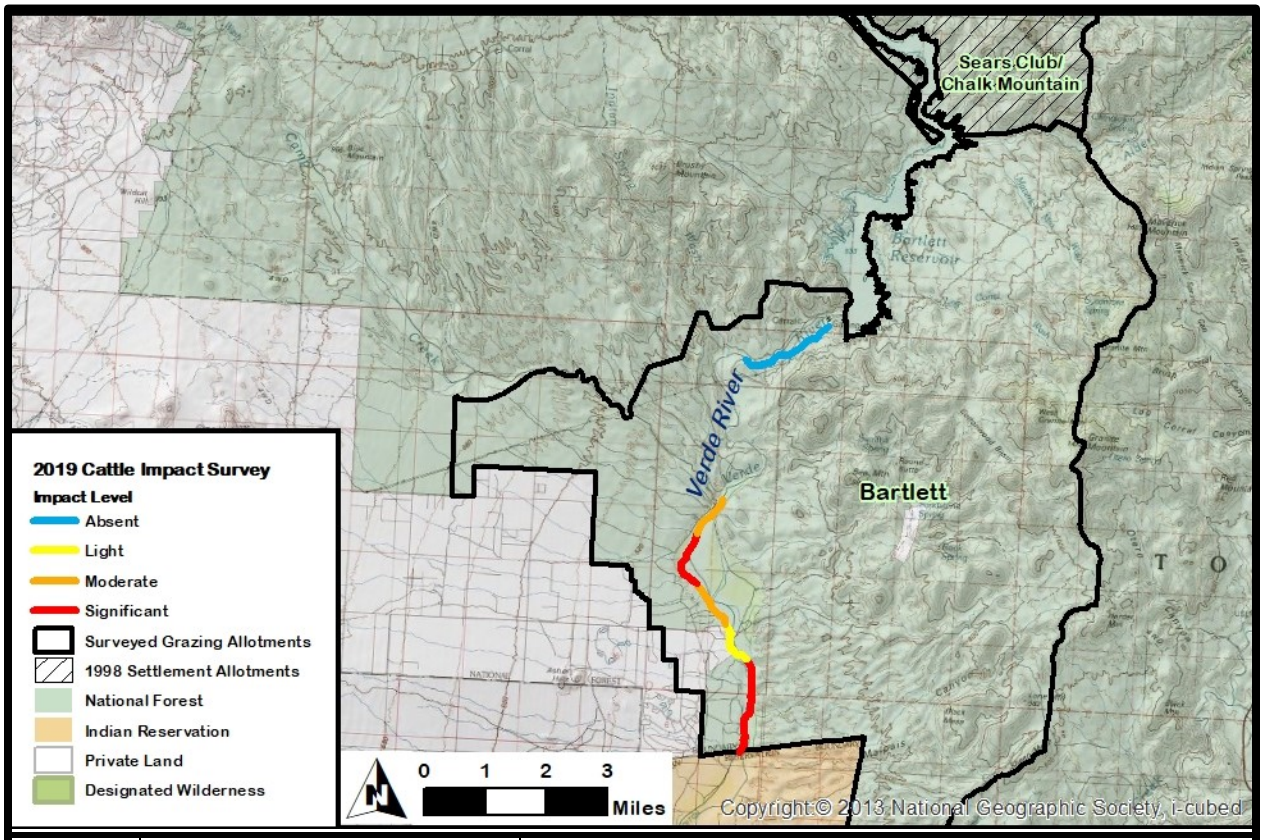


STUDY AREA	**Public Land Grazing Allotment**	**Sears Club/Chalk Mountain**
	1998 Settlement Allotment	Yes
	National Forest Unit	Tonto
	Stream Surveyed	Verde River, Sycamore Canyon
CRITICAL HABITAT	**Southwest Willow Flycatcher**	YES
	Yellow-billed Cuckoo	YES
	Northern Mexican Gartersnake	YES
	Razorback Sucker	YES

Notes: 1) 1.2 miles of Sycamore Creek were surveyed and are included in Verde River Totals.
2) Surveys could not be completed below the USGS Gaging Station due to dangerously high dam release flooding.
3) Horseshoe Reservoir was not surveyed because of recreational impacts and seasonally high water levels.

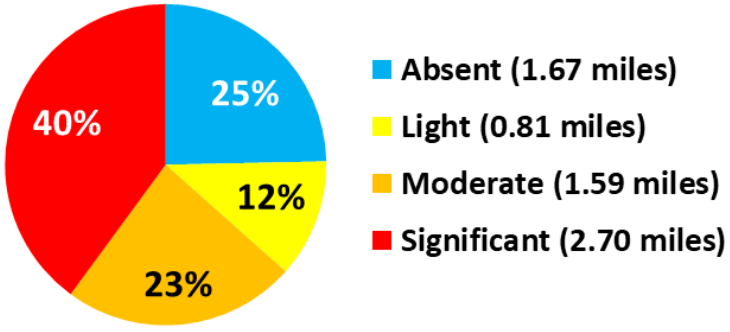
No cattle impacts were observed in the 11.4 surveyed miles of the Verde River or Sycamore Canyon in the Sears Club/Chalk Mountain Allotment.

Map 7: Outlet of Bartlett Reservoir to Boundary of Fort McDowell Indian Reservation



STUDY AREA	**Public Land Grazing Allotment**	**Bartlett**
	1998 Settlement Allotment	No
	National Forest Unit	Tonto
	Stream Surveyed	Verde River
CRITICAL HABITAT	**Yellow-billed Cuckoo (formerly)**	The entirety of this river section, including sections not surveyed, was recently eliminated from the latest revised critical habitat.

Notes: 1) Surveys could not be completed upstream from Needle Rock due to dangerously high dam release.
2) Bartlett Reservoir was not surveyed because of recreational impacts and seasonally high water levels.
3) Surveyed reaches nearest Fort McDowell Indian Reservation included many wild horse impacts.



75% OF THE 6.73 MILES SURVEYED BETWEEN BARTLETT RESERVOIR AND THE FORT MCDOWELL RESERVATION WERE IMPACTED BY CATTLE OR HORSES.
63% OF MILES SURVEYED WERE DOCUMENTED WITH MODERATE TO SEVERE IMPACTS.

Plate 9: Cattle Impact Examples in the Bartlett Allotment

Additional photos of cattle impacts, evidence of presence, and fencing condition available by request.

AREA GRAZED BY CATTLE	
Photo ID	1033
Date	7/2/19
Latitude	N 34.71442
Longitude	W 111.65513
Allotment	Bartlett
Stream	Verde River

Impacts: Feces along a heavily used trail leading from uplands to a break in the fence where cattle enter the riparian area.

AREA GRAZED BY CATTLE	
Photo ID	1083
Date	7/1/19
Latitude	N 34.72932
Longitude	W 111.65264
Allotment	Bartlett
Stream	Verde River

Impacts: Tracks and trampling at the river's edge under a cottonwood tree, with heavily grazed grasses and browsed shrubs.

Table 3: Land Ownership of Fish Critical Habitat in the Verde Watershed

Species →	Loach Minnow		Spikedace		Gila Chub		Razorback Sucker	
OWNERSHIP	**Miles**	**Percent**	**Miles**	**Percent**	**Miles**	**Percent**	**Miles**	**Percent**
Public (Federal)	75.33	52.3%	103.11	56.3%	10.44	55.8%	84.89	67.6%
Private	55.85	38.8%	66.66	36.4%	7.52	40.2%	34.42	27.4%
State	12.29	8.5%	12.36	6.8%	0.74	4.0%	4.67	3.7%
Tribal	0.42	0.3%	0.89	0.5%	0	0%	1.66	1.3%
TOTAL	**143.90**	**100.0%**	**183.02**	**100.0%**	**18.70**	**100.0%**	**125.64**	**100.0%**

Table 4: Cattle Impacts to Fish Critical Habitats in the Verde Watershed

Species →	Loach Minnow		Spikedace		Gila Chub		Razorback Sucker	
IMPACT LEVEL	**Miles**	**Percent**	**Miles**	**Percent**	**Miles**	**Percent**	**Miles**	**Percent**
Absent	7.72	16.9%	12.89	19.5%	1.82	24.2%	28.88	40.5%
Light	26.21	57.3%	30.91	46.7%	3.44	45.7%	14.54	20.4%
Moderate	6.10	13.3%	6.69	10.1%	1.16	15.4%	3.13	4.4%
Significant	5.74	12.5%	15.76	23.8%	1.11	14.7%	24.74	34.7%
TOTAL	**45.77**	**100.0%**	**66.25**	**100.0%**	**7.53**	**100.0%**	**71.29**	**100.0%**

Table 5: Summary of Cattle Impacts to Public Land Fish Critical Habitats

Species →	Loach Minnow	Spikedace	Gila Chub	Razorback Sucker
% of All Critical Habitat Surveyed in 2019 (Only USFS land was surveyed)	**31.8%**	**36.2%**	**40.3%**	**56.7%**
% of Critical Habitat in Public Ownership (All Federal Lands)	**52.3%** (95.8% USFS)	**56.3%** (96.9% USFS)	**55.8%** (100% USFS)	**67.6%** (99.7% USFS)
% of Public Land Critical Habitat Surveyed in 2019 (USFS Land Only)	**60.8%**	**64.3%**	**72.1%**	**84.0%**
% of Surveyed USFS Critical Habitat Grazed by Cattle	**83.1%**	**80.5%**	**75.8%**	**59.5%**

Table 6: Land Ownership of Bird and Reptile Critical Habitat in the Verde Watershed

Species →	Southwestern Willow Flycatcher (SWWF)		Yellow-Billed Cuckoo (YBC)		Northern Mexican Gartersnake (NMGS)		Narrow-Headed Gartersnake (NHGS)	
OWNERSHIP	**Miles**	**Percent**	**Miles**	**Percent**	**Miles**	**Percent**	**Miles**	**Percent**
Public (Federal)	43.68	55.6%	118.15	59%	123.63	62.4%	165.71	67.5%
Private	28.58	36.4%	68.09	34%	60.63	30.6%	66.27	27.0%
State	4.67	5.9%	12.23	6.1%	12.36	6.2%	11.69	4.8%
Tribal	1.66	2.1%	1.73	0.9%	1.66	0.8%	1.66	0.7%
TOTAL	**78.59**	**100.0%**	**200.2**	**100.0%**	**198.28**	**100.0%**	**245.33**	**100.0%**

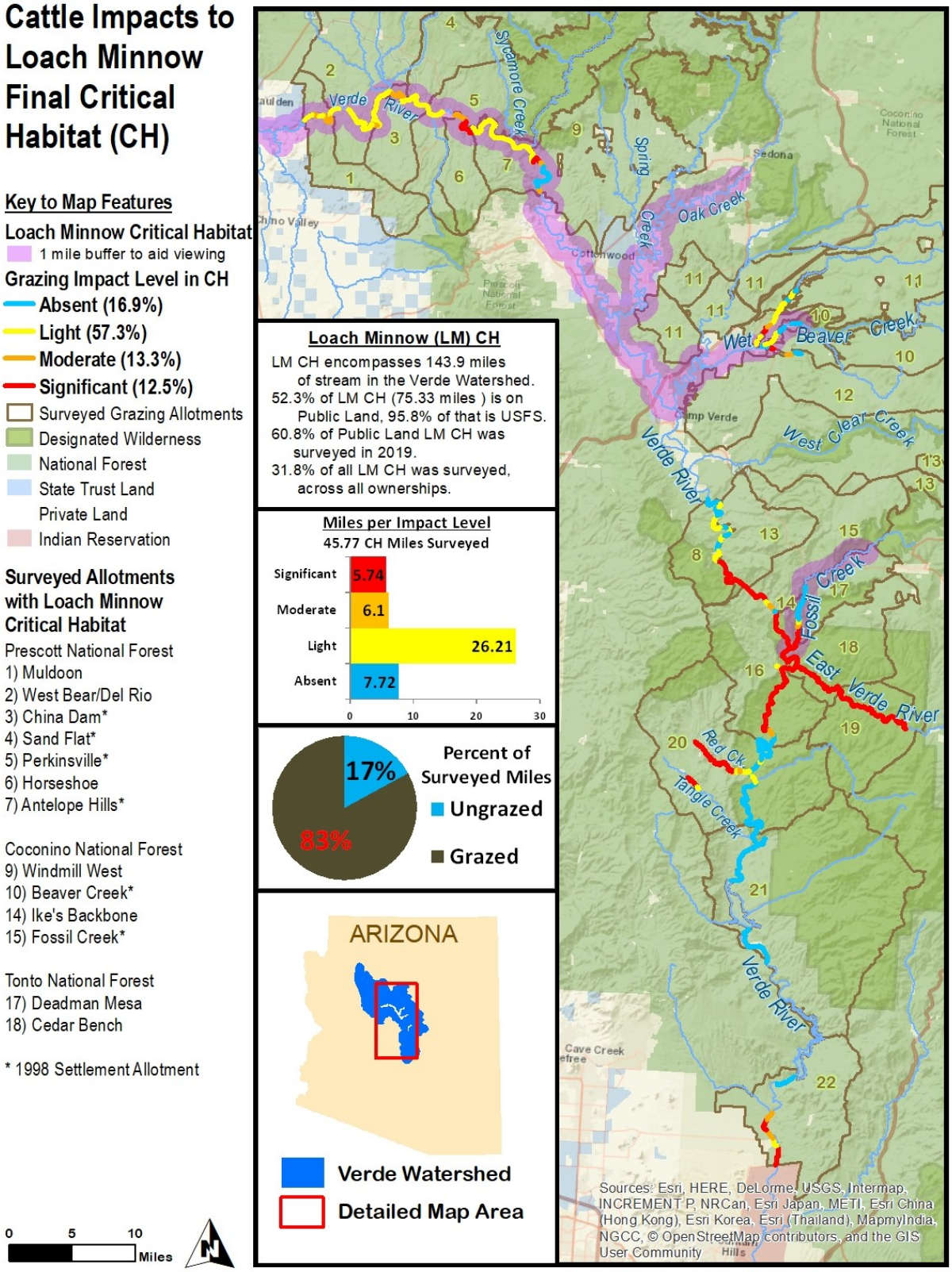
Table 7: Cattle Impacts to Bird and Reptile Critical Habitats in the Verde Watershed

Species →	SWWF		YBC		NMGS		NHGS	
IMPACT LEVEL	**Miles**	**Percent**	**Miles**	**Percent**	**Miles**	**Percent**	**Miles**	**Percent**
Absent	25.62	71.7%	32.35	39.73%	28.88	32.1%	15.91	17.5%
Light	1.17	3.3%	29.49	36.22%	29.53	32.8%	29.52	32.5%
Moderate	0.93	2.6%	7.06	8.67%	6.88	7.6%	6.88	7.6%
Significant	8.02	22.4%	12.53	15.39%	24.74	27.5%	38.60	42.5%
TOTAL	**35.74**	**100.0%**	**81.43**	**100.0%**	**90.03**	**100.0%**	**90.91**	**100.0%**

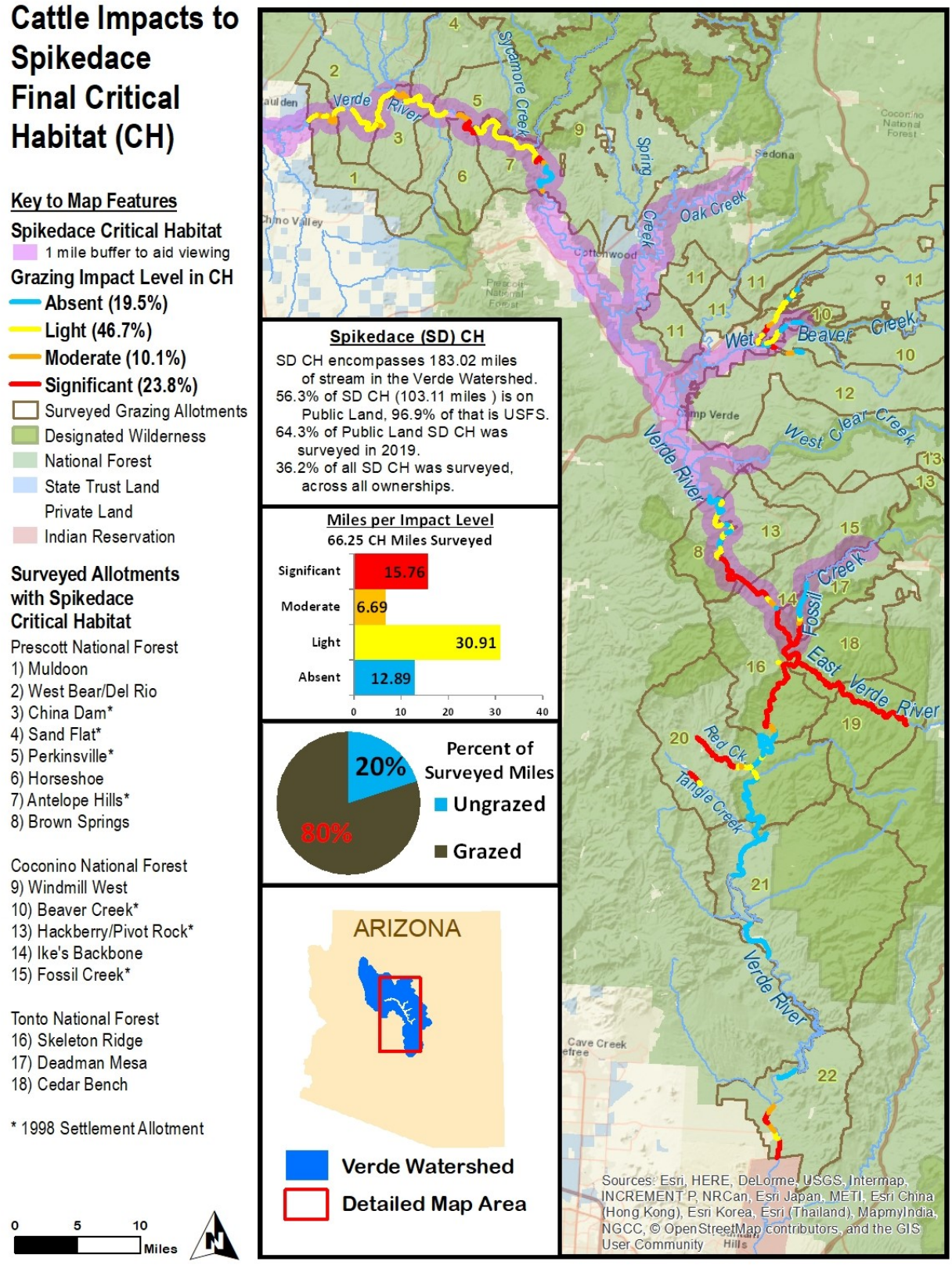
Table 8: Summary of Cattle Impacts to Public Land Bird and Reptile Critical Habitats

Species →	SWWF	YBC	NMGS	NHGS
% of All Critical Habitat Surveyed in 2019 (Only USFS land was surveyed)	**45.5%**	**40.7%**	**45.4%**	**37.1%**
% of Critical Habitat in Public Ownership (All Federal Lands)	**55.6%** (99.4% USFS)	**59%** (97.3% USFS)	**62.4%** (99.8% USFS)	**67.5%** (99.9% USFS)
% of Public Land Critical Habitat Surveyed in 2019 (USFS Land Only)	**81.8%**	**68.9%**	**72.8%**	**54.9%**
% of Surveyed USFS Critical Habitat Grazed by Cattle	**28.3%**	**60.27%**	**67.9%**	**82.5%**

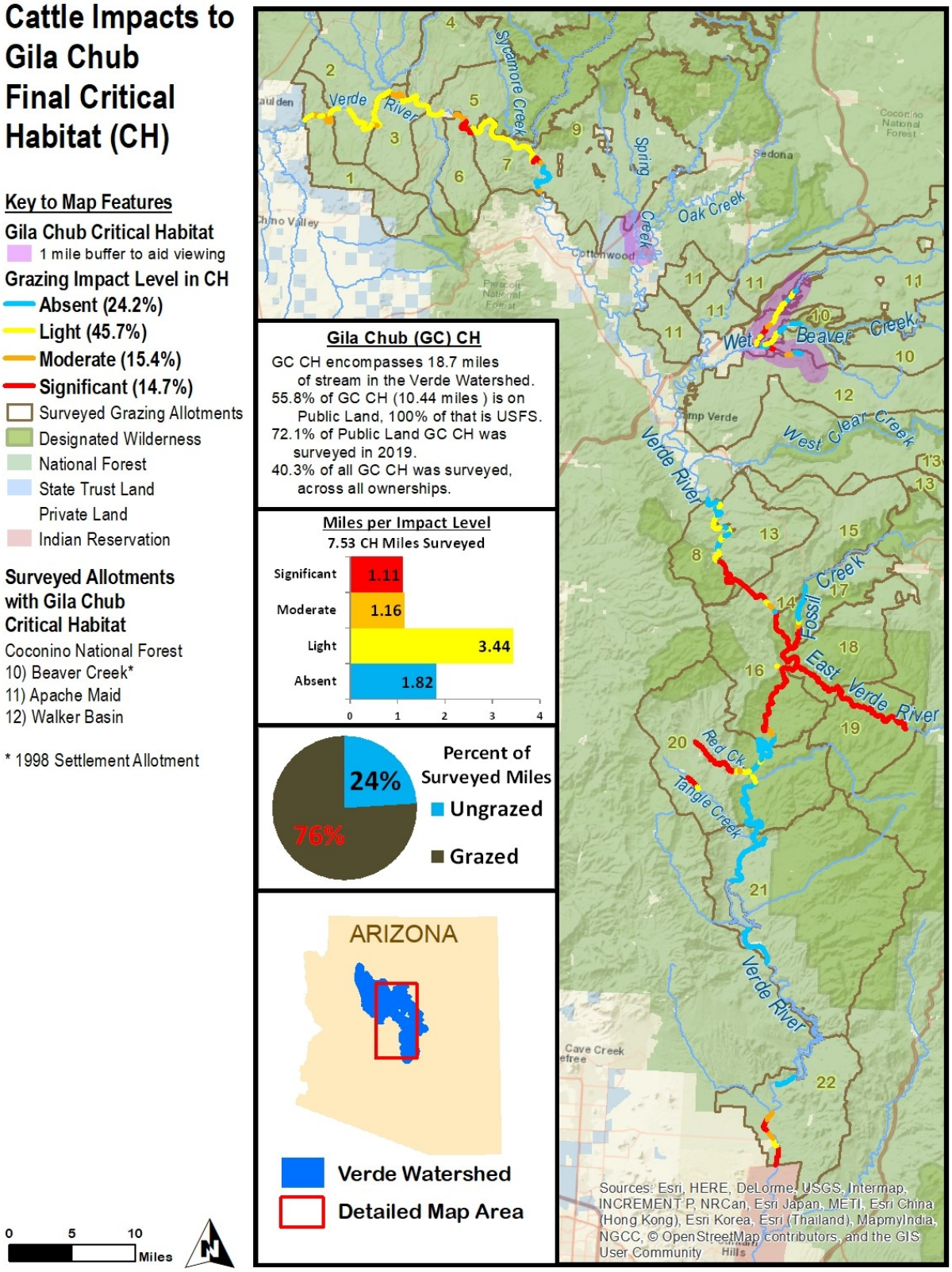
Map 8: Cattle Impacts to Loach Minnow Critical Habitat



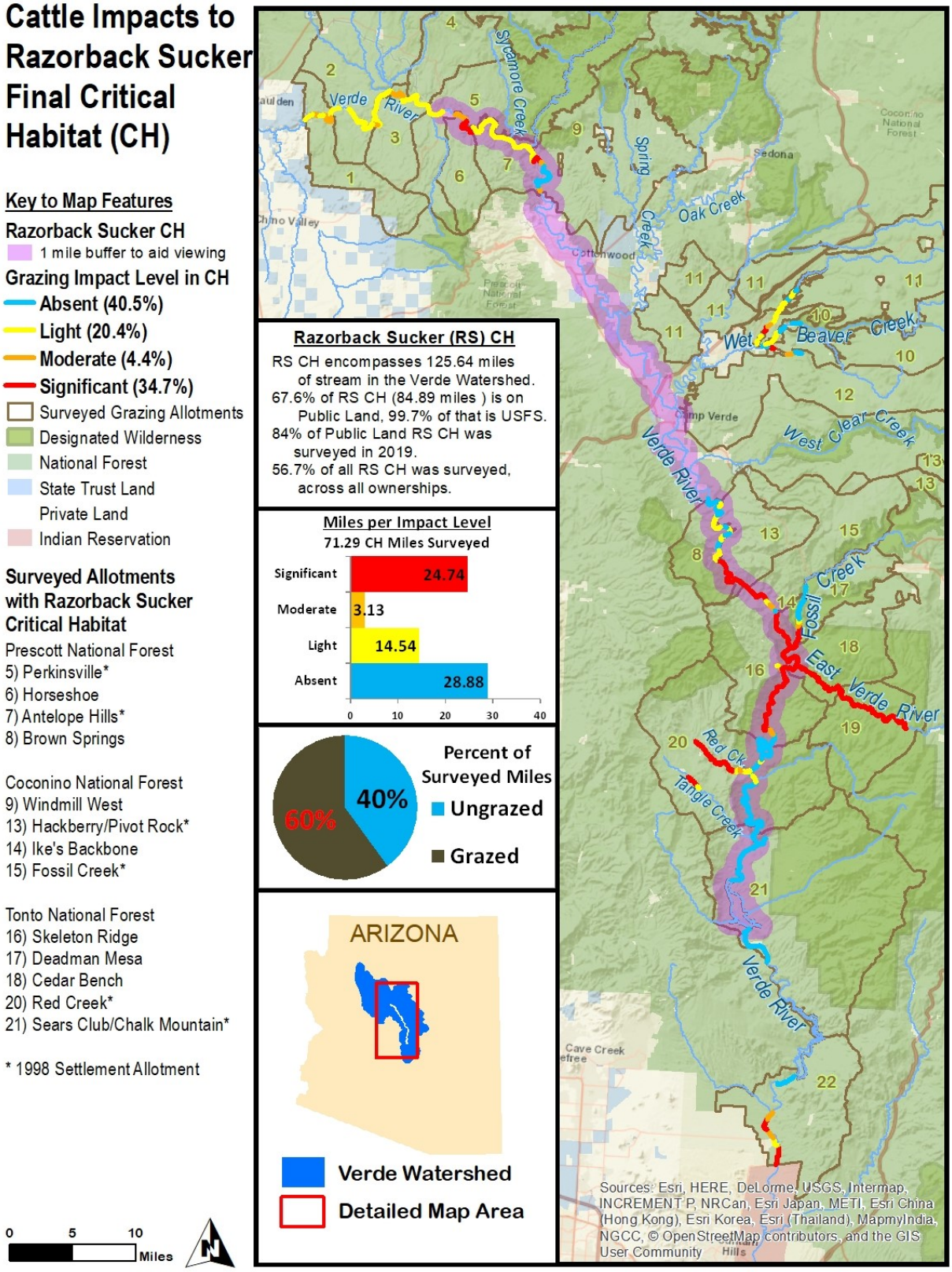
Map 9: Cattle Impacts to Spikedace Critical Habitat



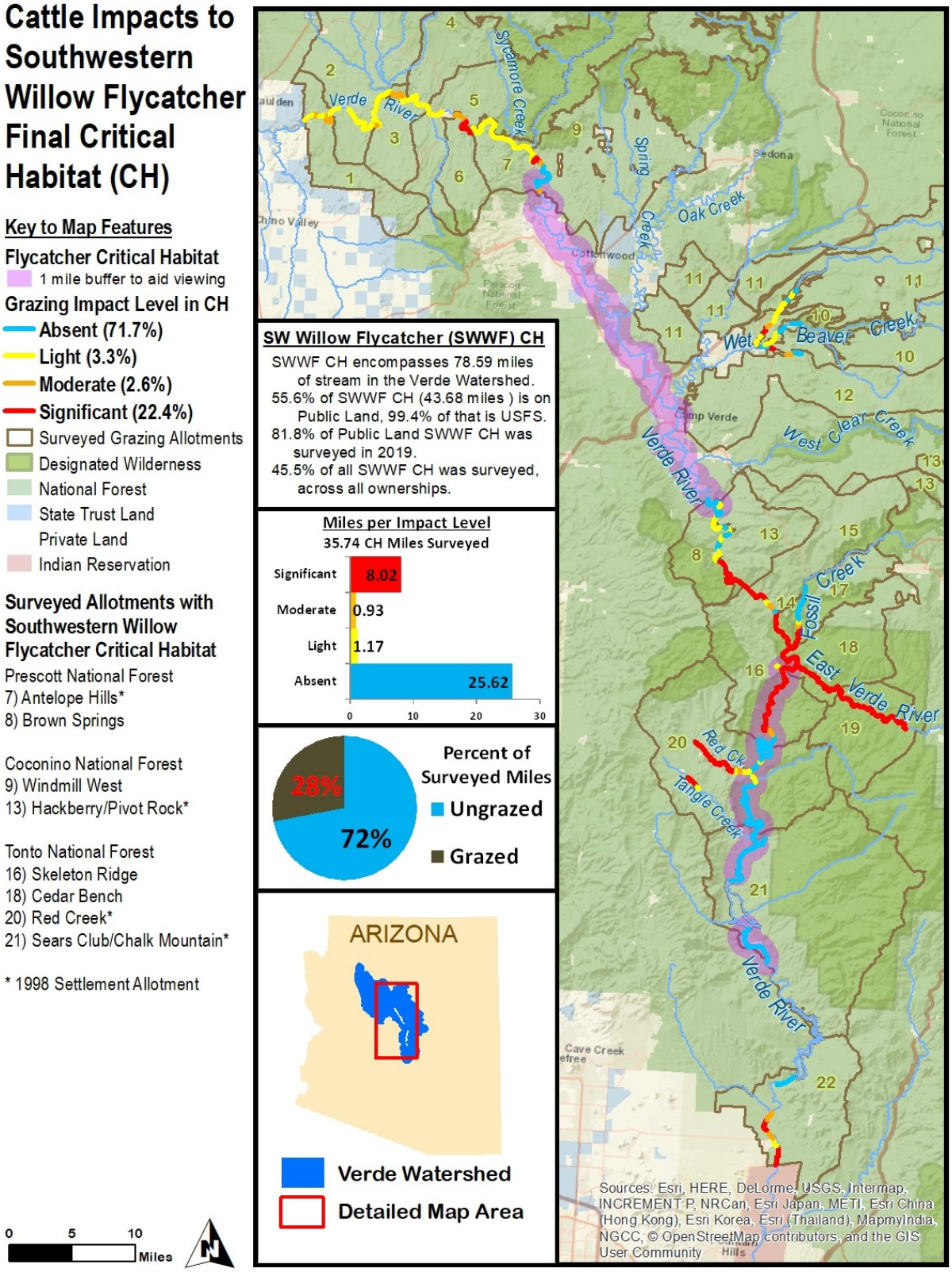
Map 10: Cattle Impacts to Gila Chub Critical Habitat



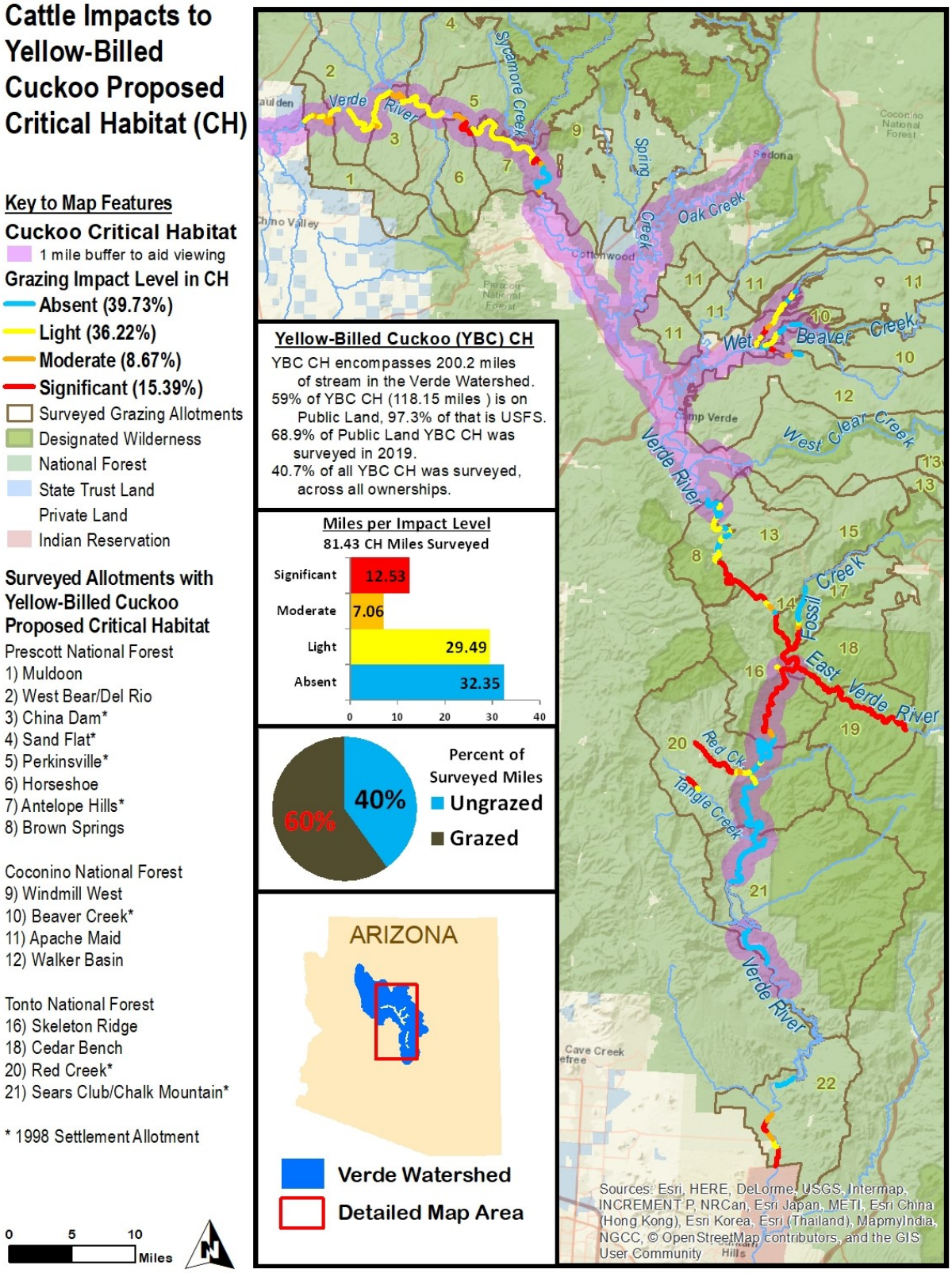
Map 11: Cattle Impacts to Razorback Sucker Critical Habitat



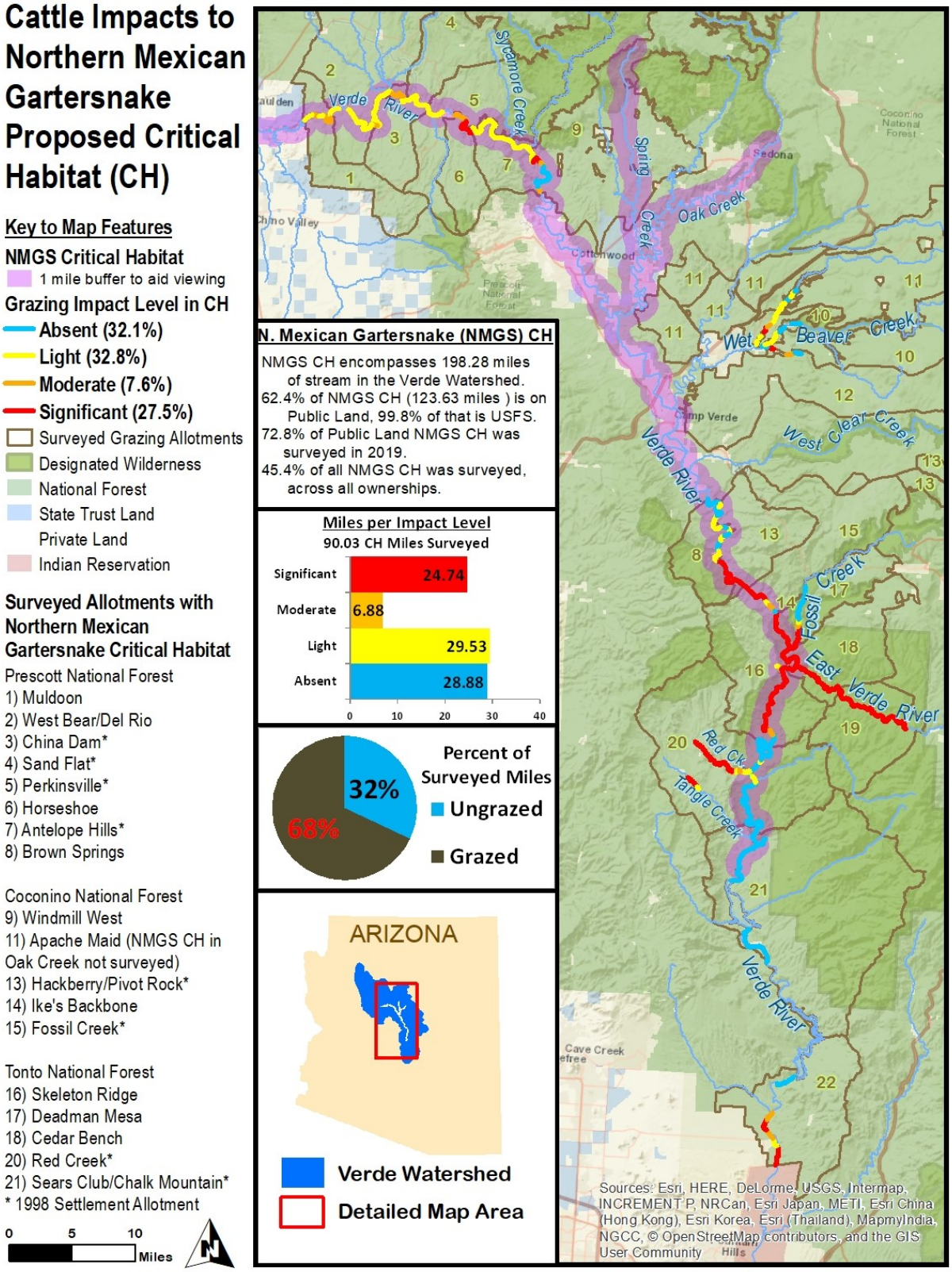
Map 12: Cattle Impacts to Southwestern Willow Flycatcher Critical Habitat



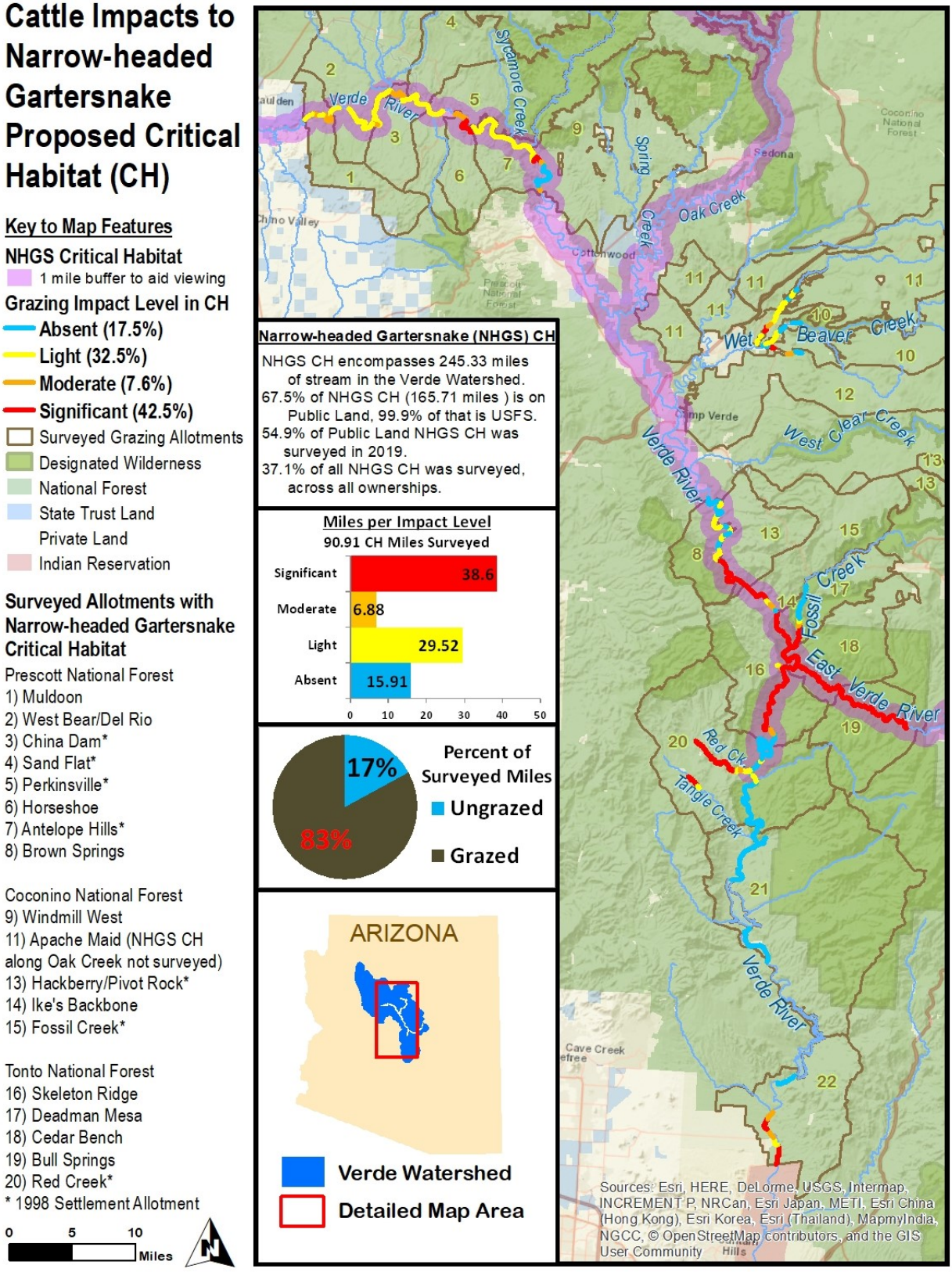
Map 13: Cattle Impacts to Yellow-Billed Cuckoo Critical Habitat



Map 14: Cattle Impacts to Northern Mexican Gartersnake Critical Habitat



Map 15: Cattle Impacts to Narrow-headed Gartersnake Critical Habitat



Conclusion and Management Recommendations

Surveys of almost 145 miles of river in the Verde Watershed documented extensive and at times severe and pervasive cattle impacts to riparian wildlife habitat in 21 of 22 surveyed grazing allotments on the Prescott, Coconino, and Tonto National Forests. A combination of feral and unauthorized cattle and horses have damaged habitat for fourteen federally protected wildlife species, including eight with critical habitat on the Verde River and its tributaries. Trampled streambanks, diminished tree and shrub regeneration, overgrazed grasses and herbs, and impaired water quality are common impacts in all allotments except for the Sears Club/Chalk Mountain Allotment on the Tonto National Forest. A database of over 1700 georeferenced photos stores documentary evidence of widespread and enduring cattle occupancy of failing riparian exclosures.

The most severely impacted portion of the study area is the stretch downstream of Browns Spring Ranch to Red Creek and Tangle Creek in the Red Creek Allotment. This area includes dozens of miles of contiguous significantly impacted habitat along the Verde Wild and Scenic River, Fossil Creek Wild and Scenic River, and the East Verde River in the Fossil Springs and Mazatzal Wilderness Areas. Red Creek, while not being designated as Critical Habitat, does support native fish protected by the ESA, such as Gila topminnow. A short stretch of Tangle Creek was surveyed, and results indicate that further surveys should be conducted in the remainder of the creek. As with Red Creek, Tangle Creek is not Critical Habitat, but a globally imperiled insect has been documented there. Current levels of grazing likely threaten the beetle's survival. Cattle use was documented along almost the entire Upper Verde River on the Prescott National Forest, a spring-fed oasis which has been closed to grazing for more than a decade. In most segments, impacts were light and scattered, but select areas were significantly impacted, such as below Perkinsville and below Sycamore Creek. Fence inspections suggest that range managers and livestock permittees are failing to maintain basic range infrastructure, consistent with many reports to the Forest Service from local conservationists.

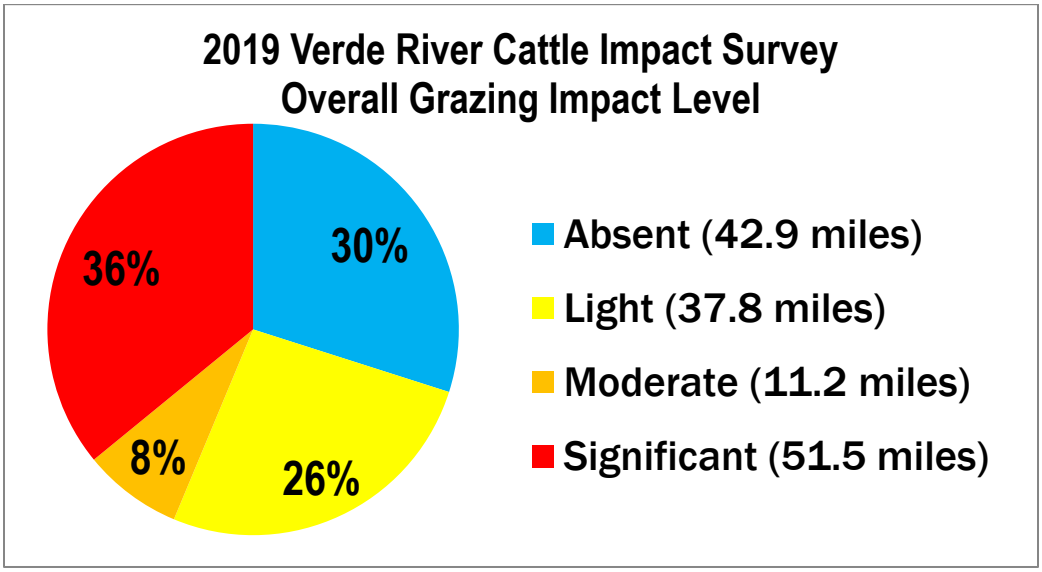
Unmaintained or entirely missing fencing renders grazing exclosures useless across much of the study area. Many fences have been destroyed by flooding events, some apparently a decade ago or more, and there has been little effort to monitor or repair breaches. Areas where natural barriers such as cliffs were assumed to impair cattle movement have proven to be ineffective. Cattle move freely between uplands and riparian areas in most areas surveyed due to porous allotment boundaries and exclosure fences and barriers, as well as gates which appear to have been left open for years. Immediate removal of feral and unauthorized livestock is urgently needed. However, due to the prevailing condition of exclosure fencing, the problem will not be solved through animal removal alone. Hundreds of miles of fencing are in need of repair or replacement, and in many cases existing locations are insufficient and fencing should be moved further into the uplands to protect the full floodplain and flood-prone side canyons where fence failures are common.

Cattle stocking rates must be evaluated and in most cases should be reduced dramatically. Access to riparian areas has artificially inflated perceived range carrying capacity by allowing more water to be available to livestock. If riparian exclosures are maintained, the ability to stock existing numbers of cattle will not be feasible. The Red Creek Allotment is a particularly good example, as cattle congregate in Red and Tangle Creeks. Without access to these waters, the upland range cannot sustain current stocking levels. Upland conditions, which in many cases are severely overgrazed and erosion prone, are contributing to the ferocity of floodwaters which destroy fencing in side canyons, as well as contribute sediment to fish habitat. Reduced upland stocking is needed to restore watershed conditions that support functioning riparian areas and hydrology.

The US Forest Service is failing in its duty to conserve federally protected species. Additional resources for monitoring, enforcement, and maintenance of riparian exclosures are needed in order to protect critical habitat and ensure that long-term species recovery is accomplished. The Center for Biological Diversity will continue to watchdog agency mismanagement and identify areas of concern.

Table 9: Condition Descriptors And Severity Scores For Six Cattle Impact Categories				
Category	Condition 1	Condition 2	Condition 3	Condition 4
Grazing Evidence On Grasses And Herbaceous Growth	LIMITED Less than 1% of the grasses impacted.	LIGHT Few to some patches of grazed area or selective grazing in patches.	MODERATE Multiple grass patches grazed, more than 20% of grass impacted in patches.	SEVERE/HEAVY Multiple patches grazed, low grass heights less than 1 inch. More than 30% grazed in patches
Browse Pressure/Woody Stems	LIMITED Less than 1% of woody stems impacted	LIGHT Browsing limited to multiyear stems	MODERATE Browse pressure on near channel woody recruitment	HEAVY/SEVERE Multiple green-line or near channel recruitment browse
Ground Cover Disturbance/Intensity	LIMITED Limited to transient evidence of use.	LOW Isolated trailing and cow trails developing.	MODERATE Multiple trails and the presence of wallows and rutting areas. Some bare soils.	SEVERE Trails, plus wallows, rutting and compaction leading to denuded ground and larger areas of bare soils.
Ground Cover Disturbance/Extent	LIMITED Few examples of disturbance.	SCATTERED Trails or disturbances in more than one location in segment.	MODERATE Trails meander through entire segment and there are multiple moderate level disturbances (see above).	PERVASIVE Multiple locations of disturbance and multiple types of disturbances, including severe moderate and low (see above).
Streambank Degradation/Intensity	LIMITED No visible signs, but other cattle impact on both sides of river that evidence crossing.	LOW Trails leading to streambank and water's edge.	MODERATE Trailing and trails creating unstable banks, some chiseling, or in low relief banks-muddy compaction	SEVERE Trailing leading to shearing and removal of a portion of the streambank leaving vertical surfaces.
Streambank Degradation/Extent	LIMITED Isolated example of streambank entry.	SCATTERED Bank degradation of any intensity in more than one location.	MODERATE Multiple examples of low and moderate bank degradation (see above).	PERVASIVE Multiple examples of low, moderate, and severe degradation (see above).

Table 10: Weighting For Overall Impact Levels Of Stream Reach Segments. Based On Condition Scores (0-4) From Six Categories Of Cattle Impacts.			
ABSENT	LIGHT IMPACT	MODERATE IMPACT	SIGNIFICANT IMPACT
All zeros	Any combination of One's & twos & zeros	At least (5) twos with any other number	Any time there are (3) threes with any other combination of numbers
		Any combination of twos, threes, and one's	Any combination of numbers with at least (1) four
	(unless (5) twos-then moderate)	*(unless (3) threes-then significant)*	
BLUE	*YELLOW*	*ORANGE*	*RED*



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[5] 60 Fed. Reg. at 10707 ("*Overuse by livestock has been a major factor in the degradation and modification of riparian habitats in the United States … Livestock grazing in riparian habitats typically results in reduction of plant species diversity and density, especially of palatable plants like willow and cottonwood saplings.*")

[6] 77 Fed. Reg. at 10,818 ("*Impacts associated with roads and bridges, changes in water quality, improper livestock grazing, and recreation have altered or destroyed many of the rivers, streams, and watershed functions in the ranges of the spikedace and loach minnow.*")

[7] 79 Fed. Reg. at 38718 ("*We found numerous effects of livestock grazing that have resulted in the historical degradation of riparian and aquatic communities that have likely affected northern Mexican and narrow-headed gartersnakes.*")

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